A flexible housing approach for self-help housing in Botswana

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A flexible housing approach for self-help housing in Botswana

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Abstract

UN-Habitat recognizes that the right to adequate housing is much more than four walls. The indicators for adequate housing as described by UN-Habitat and that are of interest to this study are: affordability, participation, habitability, cultural identity, access to services and infrastructure. Self-help housing communities in Botswana are made up of housing of poor structural and architectural quality and they are lacking in basic amenities such as access to clean water, proper sanitary services and lack of clean sources of energy. The major challenge in these communities is a lack of finance and an informal approach to design and construction in self-help housing. Informal methods are usually poorly documented and they do not follow any set standards or good practices. The other challenge is that self-help housing developments are unregulated and unmonitored. This is because self-help housing is built incrementally over-time which makes it difficult to predict how and when housing improvements will take place. As a result the quality and delivery of self-help housing is compromised. The aim of this research is to explore how self-help housing can be designed and built to accommodate changes that are difficult to predict, and still be rooted in the socio-cultural and economic context of Botswana, without compromising the quality of housing.

To address these challenges, this thesis examines the prospect of using a flexible housing approach as an effective strategy to improve the quality of self-help housing in Botswana. The design explorations were conducted using participatory action research and case study research methodologies. Thirty-five households were selected from five different wards in Mochudi as case studies. Scenario workshops, with focus groups involving local residents and local builders, were conducted to introduce and explore the application of flexible housing concepts. A flexible housing methodology is a simplified design system which allows for variations and incremental housing strategies. It is an effective design strategy that has the potential to responds to the continuously changing social needs of self-help housing in Botswana. The research findings revealed that flexible housing is economically and socially appropriate for self-help housing communities as they depend on informal livelihoods. Using this method allowed participants to expand their experience and knowledge of using progressive design approaches. This was a clear demonstration that a participatory approach empowers ordinary users and local builders with no formal design skills to create innovative housing typologies. The scenario workshops achieved their purpose of empowering participants with new knowledge and technologies for improving the quality of informal housing. The other achievement was to demonstrate that self-help housing can be subjected to the rigours of architectural design without losing its social and economic role.

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Chapter 1

Introduction

Botswana, like many other developing countries faces mounting housing shortages due to a lack of finance, inadequate policies, poor land-use management, unsustainable planning practises, and a lack of physical and social infrastructure, amongst many other challenges (Mosha, 2013, p. 137–138; Dumba and Malpass, 2000, p. 26–30; Singh et al., 2011, p. 97–98). The challenges range from people living in housing of poor structural and architectural quality with an absence of basic amenities such as access to clean water, access to proper poor sanitary services and access to clean sources of energy (Thupeng et al., 2011, p. 442; Modukanele, 2011, p. 430–431; Singh et al., 2011, p. 97–98). These conditions violate what the UN-Habitat recognizes as the right to adequate housing (UN-Habitat, 2011b, p. 1–22; Bredenoord et al., 2010, p. 274–275). The rights to adequate housing as defined by UN-Habitat are: affordability, participation, habitability, cultural identity, and access to services and infrastructure (UN-Habitat, 2011b, p. 1–22).

This study addresses these challenges by proposing flexible housing as an appropriate design strategy that empowers people to improve the quality of their self-help housing in Botswana. The flexible housing strategy is introduced through Participatory Action Research (PAR) in a focus group as a socially and economically appropriate strategy in targeting these housing problems. The hypothesis is that a flexible housing method is responsive to the continuously changing cultural values and social needs in self-help housing communities.

1.1 Background & motivation

The successful completion of a design and build shell structure project in Mochudi, Botswana, inspired the formulation for this PhD study. The project was designed

and built in collaboration with my M.Arch supervisor (Professor Richard Kroeker) from Dalhousie University in Halifax, Canada, and students from both the University of Botswana and Dalhousie University. Initially, the aim of the PhD study was to investigate the application of dome and vaulted roof structures to reduce the cost of low-income housing in Botswana. However, from initial discussions with my supervisors, combined with the empirical evidence and literature reviews, it became clear that dome and vaulted roof structures would not address housing challenges in Botswana. The conclusion was that housing research requires an inter-disciplinary approach, one that addresses the physical planning, geography, anthropology, as well as political and social paradigms. Similar arguments were made by Babbie (2015, p. xxi) that:

> "The simple fact is that technology alone will never save us. It will never make the world work ".

This study attempts to address cultural complexities in self-help housing by integrating the physical and social form of the built environment (Rapoport, 1990, p. 9–20; Awan et al., 2013, p. 56–60).

The context of this research is Mochudi which is in the Kgatleng District in Botswana. Chapter 2 provides general information about Botswana with a particular focus on Mochudi as a case study to familiarize the reader with the context of the research. During the fieldwork case study in Mochudi in 2013, it was observed that many houses were being modified; either by being extended or refurbished. This was due to a wide range of reasons such as a change in functional needs, aspirations, increase in family growth or availability of resources to build a better house. However, these changes are mostly uncoordinated and unplanned. This often compromises any future developments leading to spaces of poor architectural quality. In addition, the houses deteriorate in value over-time. As noted by Schneider and Till (2007, p. 35), in their criticism of the residential construction industry in the UK, this negates the incremental investments that people make in an attempt to improve the quality of their houses. Schneider and Till (2007, p. 35–37), further argues that this approach, also lead to costly refurbishment and an increasing number of dilapidated buildings. A participatory and a flexible housing process proposed in this study allows self-help housing owners and local builders to make incremental design changes that effectively improves the quality of housing as a whole.

In the absence of a progressive housing policies and 'effective design guidelines' in Botswana, a systematic and flexible housing framework is proposed as an alternative conceptual approach to the current trial and error conventional design practice. A flexible housing framework places design initiative and greater decision-making control in the hands of the users (Schneider and Till, 2007, p. 46–49; Alexander, 1985, p. 291–304).

This approach also helps change housing from a product-oriented approach to a process-oriented design process (Turner, 1977; Hamdi, 2010, p. xiii–xx). Determining appropriate design strategies was investigated through case study research and scenario workshops using PAR.

1.2 Research problem and research questions

Despite the fact that self-help housing has been providing housing to millions of people around the world over many years, there is still a lack of a standard or generic design process. The reliance on intuition and rule of thumb design processes are a major hindrance to the management and measurement of the successes or failures of self-help housing. Traditional experience-based design processes and conventional construction techniques are ineffective and inappropriate for the continuously changing cultural values and social demands of contemporary self-help housing. Change and growth are inevitable in self-help housing communities because of fragile and informal economic practices (Hamdi, 2010, p. 1–16).

This study proposes a flexible housing framework as an effective strategy to improve the quality of self-help housing in Mochudi, Botswana. This design strategy is developed in collaboration with the local residents and builders using participatory action research (PAR) and case study research methodologies. The following research questions were developed to guide the study and exploration of a socially appropriate design strategy for this thesis:

- How are cultural identity and social needs defined and expressed in housing design processes in Botswana?
- How effective are the current design processes in building economically and culturally sustainable housing in Botswana?
- What design methods that are socially-appropriate for self-help housing in Botswana's context?

Table 1.1 summarizes the research questions with the related research aims and theoretical constructs.

TABLE 1.1: Relationship between research questions, research aims and theoretical constructs.

Research questions / problem	**Research aims / objectives**	**Theoretical constructs**
How are cultural identity and social needs defined and expressed in housing design processes in Botswana?	**1.** Understanding the beliefs and motivation of design processes associated with self-help housing communities in Botswana. Discussed in Chapter 2. **2.** Encourage housing that is rooted in Botswana's socio-cultural values and climatic conditions *(Vernacular architecture)*: Chapter 2 and 3.	*Theoretical constructs I*: Section 1.4.1.
How effective are the current design processes in building economically and culturally sustainable housing in Botswana?	**3.** Identifying architectural forms and design spaces that people use to express their social values and cultural identity in self-help housing: Chapter 2 and 3. **4.** Encouraging self-help housing as a cost effective housing model in developing countries *(Self-help housing)*: Chapter 3.	*Theoretical constructs II*: Section 1.4.2.
What design methods that are socially-appropriate for self-help housing in Botswana's context?	**5.** Allow user-participation and empowerment in housing processes *(Collaborative & participatory design)*. Discussed in Chapter 3 and 6 **6.** Proposing a flexible design strategy to minimize initial building costs but maximizing future growth by offering possibilities to change and adapt to future use (Payne, 2006, p. 167) *(Flexible design)*: Chapter 6	*Theoretical constructs III*: Section 1.4.3.

1.3 Aims and objectives

The study has twofold aims: firstly, to identify socially appropriate design processes that empower users to build culturally sustainable self-help housing in Botswana; and secondly, to introduce a flexible design strategy (flexible housing) for self-help housing. The ultimate goal is to introduce a flexible housing approach to improve the quality

of self-help housing in Botswana. These research aims and objectives were achieved through the following outcomes of the study:

- Chapter 2 presents how social structures, beliefs and cultural values are reflected in housing and settlement patterns in Botswana. This study on housing in Botswana provided a deeper understanding and knowledge of the beliefs and motivations of design processes associated with self-help housing communities that did not exist before. This knowledge forms the basis for identifying appropriate design strategies for housing discussed in Section 7.4 and 7.3.

- The empirical studies in Chapter 2 identify architectural forms and design spaces that Mochudi residents use to express their social needs and cultural values in self-help housing. The findings from the literature review shows that there is an attempt to re-introduce the concept of simplified and replicable design in housing; a continuation of traditional Tswana architecture. However, due to lack of a responsive design approach to the continuously changing social needs and economic conditions of these communities, the design quality of housing in Mochudi is compromised.

- The study identifies the challenges and opportunities offered by self-help housing in Botswana. The literature review revealed self-help housing as a cost effective housing model in developing countries such as Botswana. The study revealed the importance of adopting the self-help housing model as it gives the end-users and local builders the control to build houses that reflect their cultural values and social needs *(Self-help housing)*.

- The use of drawings and wooden tools in this study allowed the researcher to collaboratively develop appropriate design processes with the residents and the local builders, that empower them to build houses that are socially and economically sustainable in Botswana's specific context. This process revealed the importance of developing methods and tools that empower end-users and local builders to participate in the design and construction processes of self-help housing *(Participatory design)*.

- A flexible housing strategy that minimizes initial self-help housing costs but maximizes future growth by offering possibilities to change and adapt to future use was introduced to the builders and residents in Mochudi. The study identified a flexible housing approach as an appropriate model that responds to continuously changing social needs and aspirations without compromising the quality of self-help housing *(Flexible housing)*.

To achieve the aims and objectives the research adopts theoretical constructs which form the basis for a structured approach in data collection and data analysis. Theoretical constructs are briefly discussed in the following section.

1.4 Theoretical constructs

Three theoretical constructs were developed to investigate appropriate strategies for housing in Botswana. The development of the theoretical constructs is discussed in great details throughout this thesis and is only briefly introduced in the following sections.

1.4.1 Theoretical constructs I: Socio-cultural transformations

This part of the study identifies and establishes the importance of cultural and social values in self-help housing. It is not intended to give a historical account of traditional Tswana[1] architecture but an attempt to demonstrate the qualities of traditional practises that can be of benefit to self-help housing in Botswana. In the past, traditional Tswana architecture was studied to describe, document and conserve historical and traditional buildings, most of which has been consigned to archival records. While it is extremely important in architectural research to record and document vernacular practices from a historical, theoretical and descriptive perspective, it is even more crucial to develop new theoretical approaches and practical tools for present and future housing needs Asquith (2005, p. 128–144). Vellinga (2005, p. 83) and Oliver (2005, p. 262–268) suggest that instead of thinking of historical and traditional buildings as static artefacts in a pristine state, we should focus on how they will change and adapt to the cultural and environmental challenges of the present and future.

1.4.2 Theoretical constructs II: Participatory housing processes

This theoretical construct seeks to collaboratively introduce and explore design interventions with the end-users and the local builders as the key decision-makers in the process. One of the main principles of self-help housing, is that it places key-decision making responsibility in the hands of the inhabitants (Turner, 1977, p. 155). According to Oliver (2010, p. 15), self-help housing is by the occupants by themselves, without external professional intervention. Turner (1977, p. 89–101) contends that self-help housing as a process can adequately meet people's housing needs and gives the dweller control over what is appropriate for them. This approach allows dwellers to become active recipients

[1]The Tswana means *Batswana*; the plural term for people in Botswana.

or consumers of housing products resulting in houses that reflect their values and needs (Oliver, 2010, p. 16; Turner, 1977, p. 155).

1.4.3 Theoretical constructs III: Change, transformations and flexibility in use

As stated in the introduction of this chapter, the hypothesis is that a flexible housing strategy, introduced through PAR, is a socially and economically viable method for housing delivery in low-income communities. This theoretical construct seeks to introduce and explore this method with local residents and builders in Mochudi. The intended outcome is to demonstrate the importance of a flexible housing to overcome the social and economic challenges for housing people in low-income communities.

1.5 Participation, flexibility and enablement

Hamdi et al. (1995)'s book, *Housing without Houses: Participation, flexibility, enablement*, became influential in the early 21st century as it offered an alternative design and policy approach that was adopted by institutions that deliver and manage housing. Hamdi et al. (1995)'s theoretical approach became influential in changing the thinking in the design processes and policy formulation that manages the built form (Hamdi et al., 1995). Hamdi et al. (1995)'s work draws from Habraken (1972)'s and Turner (1972)'s theoretical approach to low-income housing developed in the 1960s. The concepts developed by Habraken (1972) and Turner (1972) changed housing from a *provider paradigm* to a *supporter paradigm*. The *supporter*'s housing model, as developed separately by Habraken (1972) (in Holland), and Turner (1972) (in Peru), was a critic to the *provider*'s housing model. Their ideas became influential and adopted by users, academics, practitioners, government and funding bodies around the world (Hamdi et al., 1995, p. 38). Before the *supporter*'s housing model was developed, the *provider*'s housing model dominated public institutions, with the government as the 'provider' and people as 'recipients'. Hamdi et al. (1995, p. 39) contends that this housing model was both 'uneconomic and inefficient'.

Both Habraken (1972) and Turner (1972) approached housing as a process but there were major differences as to how that process was achieved (Hamdi et al., 1995). Turner (1972, p. 155) argue that housing as a process can only be achieved by placing key decision-making responsibilities in the hands of the inhabitants. Consequently, this means changes at many levels of housing delivery; from the governmental, to the institutional, from the professional, and to the individual involved in housing (Turner and Fichter,

1972, p. 26–34). Habraken (1972)'s concern was less about the institutions that govern housing (Hamdi et al., 1995, p. 38). He was also less concerned about developing alternative economic models for low-income housing as Turner (1972), but on how architecture can facilitate participation and flexibility in design and construction process of housing. Habraken (1972) argued that architecture should occupy itself with the design and building of houses, and let others deal with the other aspects of housing.

Habraken (1972) and Turner (1972)'s ideas led to Hamdi et al. (1995, p. 39) redefining the *support paradigm* with the

> "... three tenets for design: *flexibility*, *participation*, and *enablement*".

These tenets and their approach to housing by Hamdi (2010; 1995), emphasize the importance of building social infrastructure as key to the housing process. The theoretical constructs developed for this study are derived from empirical research as well as based on these tenets. They were developed to meet the ultimate goal of this study, which was to introduce a flexible housing approach *(flexibility)*, explored through participatory action research *(participation)*, as a way of empowering (or *enablement*, using Hamdi et al. (1995)'s term) self-help housing owners and local builders to improve the quality of their living environments. This way, architecture is used to empower end-users (Schneider and Till, 2009, p. 99–100) with the technical know-how in order to:

> "... overcome the structural, economic and psychological barriers to the development of their own communities..." (Till and Schneider, 2012, p. 42).

1.6 Research framework

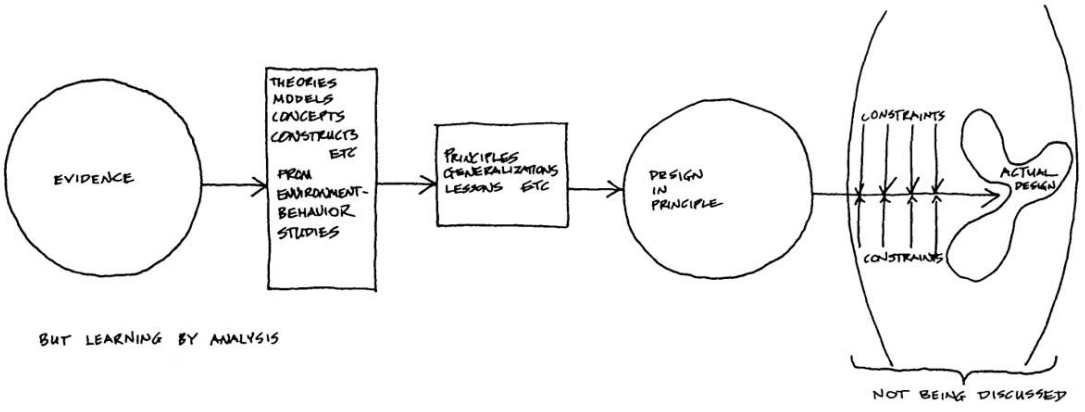


FIGURE 1.1: A diagram illustrating a process of analyzing traditional environments, understanding their concepts, and applying the lessons in theory and design of buildings. Source: Rapoport (1998, p. 5)

Figure 1.1 by Rapoport (1998, p. 5), is an illustration of a process of analysing traditional environments, understanding their concepts, and applying the lessons in theory and design of buildings. The intention of this study is not to provide a step by step method of design but to draw attention to the value of learning from existing informal design methods and cultural practices. This process serves as a base for developing appropriate housing that reflects people's way of life, their social needs and cultural preferences. This is done through a re-interpretation of the traditional and vernacular Tswana houses, especially during the period of 1960s to 1980s. This period is well documented in archival records, historical maps, population data, and literature. It is also a period when Botswana went through rapid transformations from a traditional to an industrialized society.

The research method used is qualitative and it is essentially in two parts as illustrated in Figure 1.2. The first part is a case study research and the second part is focused in exploring the use of a flexible housing strategy through participatory action research (PAR). The first part (A) is observation and identification of the cultural values and meanings in Tswana architecture through literature and case studies (1), which leads to an understanding of dwellings through existing theories, concepts and housing models (2), and that forms the basis for the second part of the research. The second part of the research, which is PAR, seeks to collaboratively introduce and explore design interventions with the end-users and the local builders as the key decision-makers in the process (B). It explores the application of a flexible housing process developed through a participatory approach, as a possible solution to improve the quality of self-help housing (3). This is examined and analysed through participatory action research using focus groups (4). The primary objective is to empower the end-users and the local builders to adopt socially and economically viable methods to improve the quality of their housing (5). It is possible that after the design explorations, new cultural preferences and building forms emerge, leading to a 'new vernacular architecture' (6).

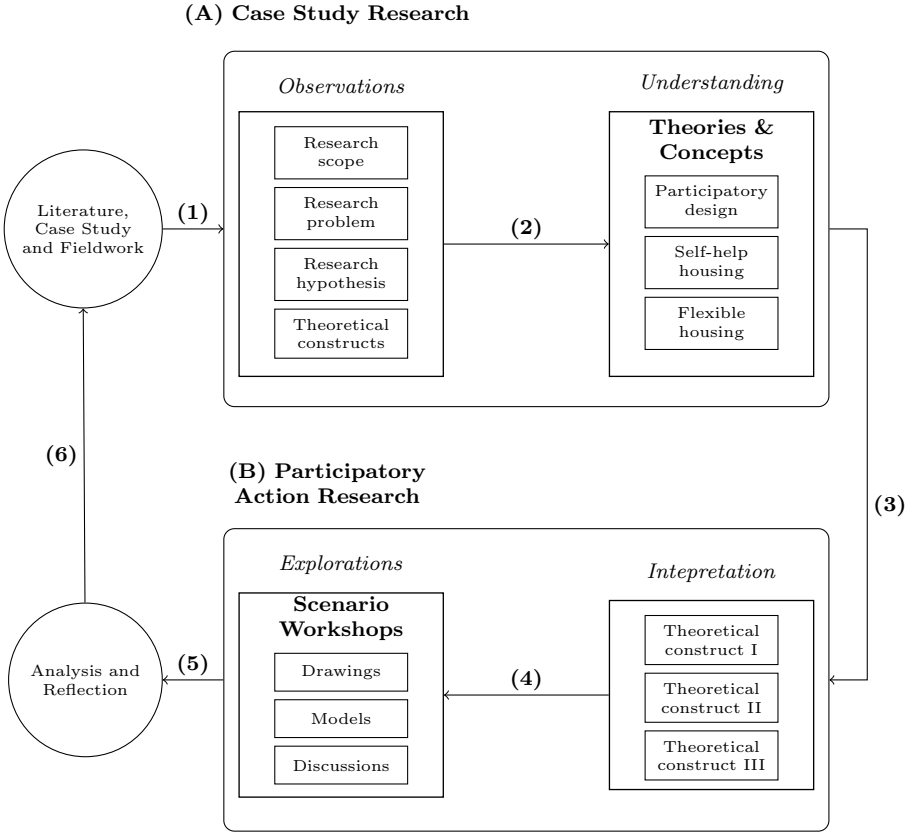


FIGURE 1.2: A 'case study research' and 'participatory action research' processes

1.7 Delimitation of the study

This thesis is written from an architectural perspective, placing emphasis on formal and aesthetic design qualities rather than on financial and legal frameworks. Housing financing, housing policy, and land administration are important and key factors in housing that need to addressed but are beyond the scope of this work. However, it is worth noting that the concept of flexible housing still addresses these issues. For example, the concept allows houses to be built incrementally depending on the availability of finances, adding spaces without compromising the quality of the house, while also upgrading services such as water connection and sanitation. The success of such an innovative idea will have an impact on future policies, land administration and the financing of housing.

The flexible housing design strategy introduced in this study is focused on owner-occupied self-help housing, where the owners and local builders are still actively involved in the design and construction process. There are three major benefits to focusing on owner-occupied households built by local builders. Firstly, start-up costs are low and solutions can easily be appropriated or localized (Hamdi, 2010, p. 2–16). Secondly,

centralized approaches to housing problems have proved to be inefficient both in regards to cost and administration as housing challenges are diverse and unique in their nature (Hamdi, 2010, p. 2–16; Turner, 1977, p. 17–26). Thirdly, the household is an important traditional form of social unit in Botswana villages and one that needs to be empowered and nurtured (Larsson, 1996, p. 13–14; Hammami, 2012, p. 269).

1.8 Research methods and findings

As already stated in Section 1.3, the aim of the research was to identify socially appropriate design strategies and also to suggest flexible housing as a way of improving the quality of self-help housing in Botswana. Identifying socially appropriate design strategies is investigated using different qualitative research methods to suggest possible solutions or findings. Table 1.2 gives a summary of an overview of research methods and findings.

TABLE 1.2: A summary of an overview of research methods and findings.

Research methods	Research findings
Case study research.	
i) Structured and semi-structured interviews: Interviews were used in research data collection to get information on respondents' beliefs and knowledge. *Section 4.5.2 and 4.5.4.*	*i) Social structure, beliefs and cultural values:* The case study research revealed how social needs and cultural values are reflected in the physical structure and spatial organization of housing and settlement patterns. Also, the study observed significant changes in architectural forms and design spaces, which reflect people's changing social values and cultural identity in Mochudi.
ii) Drawings and photographs: They provide visual evidence of the housing forms and activities within them. *Section 4.5.5.*	*ii) Vernacular architecture:* The case study revealed that there is still much to learn from the traditional housing approach that can greatly improve the quality of housing in Mochudi.
iii) Survey maps and physical survey: Geospatial data was collected through measuring, recording and analysing physical form. *Section 4.5.5.*	*iii) Design strategy:* The conclusion from the case study research is that there is a need to find a socially appropriate design strategy (flexible housing).
iv) Observation: Direct and indirect observations methods were used in describing and analysing the social and cultural values in housing. *Section 4.5.5.*	
v) Analysis of public documents: Official documents, letters, memoranda, photographs and newspaper articles were consulted to provide useful information for research. *Section 4.5.5.*	
Participatory action research.	
i) Open-ended discussions - Focus group: Provided an opportunity for an in-depth discussion and exploration of appropriate design methods for improving the quality of self-help housing in Botswana. *Section 4.5.3.*	*i) Collaboration and empowerment:* The study revealed the importance of engaging end-users and local builders as key stakeholders to effectively deliver self-help housing. In order to achieve this, the findings demonstrated that it is critical to develop tools that are easy to understand and use.
ii) Scenario workshops: The purpose of the scenario activities was meant to guide the explorations of the possible use of a flexible housing strategy in collaboration with the research participants. Scenario workshops were conducted over a period of two-days to introduce the concepts of flexible housing to the research participants. *Section 4.4.2.4.*	*ii) Flexible housing:* The findings demonstrated the importance of flexible housing to overcome the social and economic challenges for self-help housing people.

1.9 Thesis structure

Following the thesis introduction chapter, the following outlines how the thesis addresses the research questions, aims and objectives to research findings and conclusions:

Chapter 1: Introduction

This chapter introduces the research motivation and background. It also identifies gaps in the existing housing research to generate research problems and scope for this study. The research framework and research structure are also given. The chapter concludes by exploring strategies in addressing the objectives of the thesis and research questions.

Chapter 2: Settlements and dwellings in Botswana

This chapter sets out the context of the case study which is in Mochudi, Botswana. It presents a general historical background of Botswana with a particular focus on housing policies and design strategies. It is an overview of the housing situation in Botswana, demographic information, settlement organization, economic situation and political institutions that influences housing policies and programmes.

Chapter 3: Self-help housing and flexible housing

This chapter reviews and discusses the most influential and relevant housing concepts, and architectural design theories. The first part of the research is to establish and understand the essential cultural and social values in housing by studying Botswana's physical housing forms and spatial settlement. The second part explores the relevance of a flexible housing framework explored through participatory action research, as a possible solution to improve the quality of self-help housing.

Chapter 4: Research methodology

This chapter discusses the research methodologies and philosophical assumptions in this study. It is also a justification of the research design, data collection and data analysis methods. The research design of the case study research and the participatory action research is presented and how that was applied in fieldwork study. The validation and evaluation procedures are also developed and established.

Chapter 5: Case study research - Mochudi

This chapter presents the context of self-help housing, which are owner-occupied and built by the occupants themselves with the help of local builders in Mochudi, Botswana. Houses were chosen from five different wards, namely: Boseja ward, Mabudisa ward, Makakatela ward, Matamora ward, and Tlagadi ward. The aim of the study was to present how the social structure, beliefs and cultural values are reflected in the physical structure and spatial organization of housing and settlement patterns. This forms the basis of exploring appropriate design strategies for self-help housing in Botswana.

Chapter 6: Participatory action research - Focus Group

This chapter seeks to collaboratively explore design interventions with the end-users and the local builders as the key decision-makers in the process. This is examined and analysed through participatory action research using scenario workshops with focus groups. The aim is to explore and assess design strategies that empowers the end-users and the local builders to adopt socially and economically viable methods to improve the quality of their housing.

Chapter 7: Observations and analysis

This chapter presents the findings of the data collection and analysis. Data collected to address the research questions, research propositions and hypothesis, is discussed within the interpretive frameworks and theoretical constructs presented in the methodology chapter. Thematic analysis was used to analyse and present the data.

Chapter 8: Concluding discussions and recommendations

This chapter is the conclusion from the empirical research findings and recommendations for theoretical and practical housing intervention methods. It discusses the success of introducing a flexible housing to improve the quality of self-help housing in Botswana. The contribution of the research findings to policy, knowledge and theory is discussed. It concludes by identifying the limitations of the research and suggestions for further research areas.

Chapter 2

Settlements and dwellings in Botswana

2.1 Introduction

This chapter familiarizes the reader with the context of the case study by providing the background information necessary for understanding this dissertation. The first section begins by giving a general historical background of Botswana with a particular focus on self-help housing (Section 2.2). This section presents an overview of the housing situation in Botswana; demographic information, settlement organization, economic situation and political institutions as key factors which influence housing policies and programmes in the country. The second section presents a detailed description of the social structure, political order and spatial organization of the traditional settlements in Botswana (Section 2.3). Cultural values, aspirations and social needs and transformations of housing typologies are also discussed under this section. The third section gives insights into the current housing challenges in Botswana by discussing housing policies, housing financing, design strategies, construction processes, building materials and technologies, with a particular focus on Mochudi as a case study (Section 2.4). This chapter concludes by presenting the changes and transformations in housing over the years in Botswana (Section 2.5).

2.2 Background

Botswana, also known as the Beacon of Africa, is located in the Southern part of the Sub-Saharan group of countries (see Figure 2.1). It has a hot and semi-arid climate

with predominantly two seasons, summer and winter. The country's economy which is dependant on diamonds, has propelled Botswana to a middle-income class (OECD, 2010; Republic of Botswana, 2015). The rise of the diamond economy has allowed the government to provide free health services, free education and many other economic and social benefits freely to its citizens for many years (OECD, 2010; Republic of Botswana, 2015). Recently, the government has come up with cost-sharing measures as diamonds will be depleted in the near future (Republic of Botswana, 2014a). Unfortunately, the economic boom has led to unprecedented urban growth as a result of rural-urban migration. Mochudi, which is near the capital city of Gaborone, is undergoing rapid transformation due to people moving to the city for economic opportunities (CSO, 2013). The following sections presents the general tribal groups with a particular focus on the Bakgatla (the tribe in Mochudi), the climate and topography, the economic profile of the country, the housing policies and challenges, and concludes by briefly describing the context of the case study (Mochudi).

FIGURE 2.1: A Botswana Map, a landlocked country located in Southern Africa. Map reproduced from *Source*: (Embassy Information, 2015).

2.2.1 The people - the Bakgatla

The tribes in Botswana can simply be categorised into two; the dominant Tswana–speaking tribes and the minority non Tswana-speaking tribes (Gluckman, 1953; Solway and Nyati– Ramahobo, 2004). The Bakgatla belong to the Tswana–speaking tribes. There

are 28 languages in Botswana spoken by different tribes (Nyati– Saleshando, 2011). However, the official languages are the Setswana and English (Hasselbring et al., 2001; Nyati– Saleshando, 2011). The constitution of Botswana only recognizes the dominant Tswana–speaking tribes (Nyati– Saleshando, 2011; Solway and Nyati– Ramahobo, 2004). These constitutional rights gave the Setswana–speaking tribes access to land, and the non Setswana–speaking were left to get land through the Tswana–speaking tribal chiefs (Nyati– Saleshando, 2011, p. 570). As a result, the Setswana–speaking chiefs were given superior administrative powers over the non Setswana-speaking tribes (Nyati– Saleshando, 2011, p. 570). It is important to note that the basis of recognizing them as the dominant tribes, is not because of their population, as the non Tswana–speaking tribes are the majority. According to literature, 18 % of the population speaks Setswana as the first language (Nyati– Saleshando, 2011, p. 571). However, this figure cannot be verified as the population census does not reflect the composition of tribes in Botswana. It is the government's decision not to allow categorization of tribes for the sake of national unity over ethnic identity (Werbner, 2004). The merits of this decision will not be discussed here but it is important to mention that this has possibly contributed to the lose of architectural and cultural identity in pursuit of national and global identity.

The majority of Botswana's two million population is concentrated in the eastern part of the country (Gwedu et al., 2011, p. 13). This is mainly due to fertile soil and reliable rainfall for agricultural purposes (Gwedu et al., 2011). The railway line in the eastern region connects Botswana to its neighbouring countries, this provides economic opportunities for villages alongside the railway line (Gwedu et al., 2011). The population is projected to increase by 344,041 from the 2001 census; representing and annual growth rate of 1.9 % (Gwedu et al., 2011, p. 3). The South East district, which is close to Mochudi and also is where the capital city is located, grew by 40.2 % since the 2001 population census (Gwedu et al., 2011, p. 3). This is mainly due to migration into the city by people looking for economic opportunities. In the long term, this will have an impact on the housing challenges in Mochudi as people migrate to Mochudi looking for cheaper houses to rent.

Figure 2.2 shows the distribution of settlements by planning regions. Cities, towns and urban villages are concentrated on the eastern part of the country and there are more employment opportunities (Gwedu et al., 2011, p. 12). The 2011 population report states that about 64 % of the population is urban (Gwedu et al., 2011, p. 11). Table 2.1 shows that 90 % of the national population lives either in urban villages, rural villages or towns and cities while the rest live in lands areas, cattle posts, freehold farms and caps (Gwedu et al., 2011, p. 11).

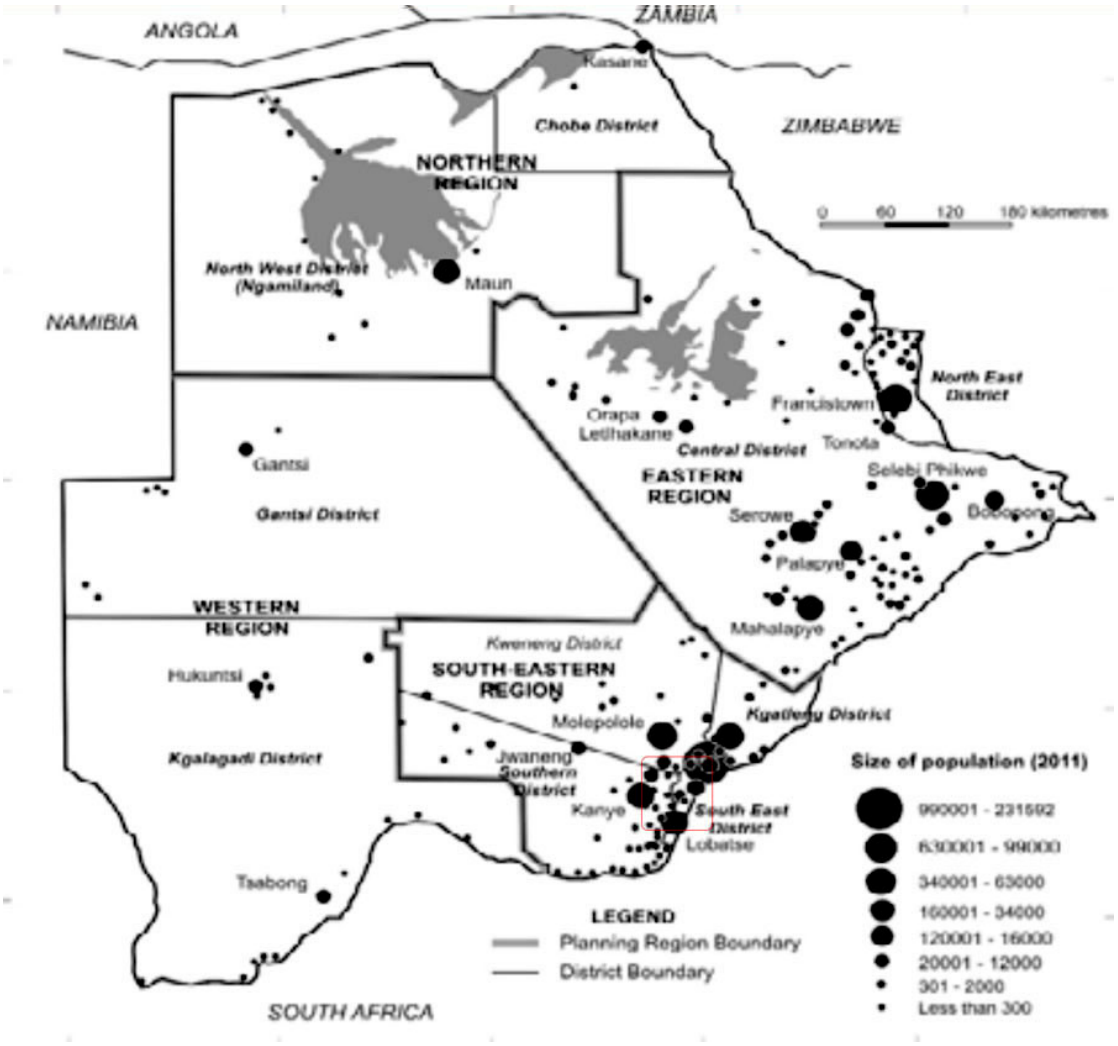


FIGURE 2.2: Distribution of human settlements by planning regions showing that the population is concentrated on the eastern side of Botswana; mainly because of the reliable rainfall, fertile soils and economic opportunities.. *Source*: (Gwedu et al., 2011, p. 12).

TABLE 2.1: Distribution of the population by place. *Source*: (Statistics Botswana, 2013, p. 12).

Place	**Frequency**	**Percent**	**Sex ratio**
City/Town	440,108	21.7	92.1
Urban Villages	857,179	42.3	88.2
Rural Villages	523,687	25.9	87.4
Lands Area	92,776	4.6	136.8
Cattle Post	52,849	2.6	189.1
Freehold Farms	15,170	0.7	146.2
Mixture of Lands and Cattle Post	20,203	1.0	155.8
Camp or Other Locality Type	22,932	1.1	186.2
Total	**2,024,904**	**100.0**	**95.5**

Table 2.2 shows that the population is made of 51.2 % of women (Gwedu et al., 2011, p. 5). This is attributed to women being able outlive men (Gwedu et al., 2011, p. 5). Gwedu et al. (2011, p. 11) reports that the population is youthful with 32.7 % percent of it below the age of 15. The elderly population only constitute 5.1 %, which is relatively high compared with other African countries (Gwedu et al., 2011, p. 6).

TABLE 2.2: Population and percentage distribution by age and sex. *Source*: (Gwedu et al., 2011, p. 6).

Age	**Male**	**Percent**	**Female**	**Percent**	**Total**
0-4	120046	50.6	117341	49.4	237387
5-9	108561	50.5	106622	49.5	215183
10-14	104468	50.4	102976	49.6	207444
15-19	104847	49.7	105956	50.3	210803
20-24	97270	48.6	103045	51.4	200315
25-29	101193	48.7	106576	51.3	207769
30-34	84507	49.6	85989	50.4	170496
35-39	68438	50.6	66765	49.4	135203
40-44	48757	49.1	50494	50.9	99251
45-49	37879	46.1	44358	53.9	82237
50-54	29737	44.8	36616	55.2	66353
55-59	24363	45.1	29685	54.9	54048
60-64	17343	46.2	20235	53.8	37578
65-69	12237	44.1	15504	55.9	27741
70-74	9461	42.5	12788	57.5	22249
75-79	6963	38.9	10915	61.1	17878
80-84	4868	36.8	8344	63.2	13212
85 and above	8133	41.2	11624	58.8	19757
Total	**989,071**	**48.8**	**1,035,833**	**51.2**	**2,024,904**

As already mentioned, the focus of this study is on the Bakgatla tribe in Mochudi. The *Bakgatla* originates from Moruleng in South Africa (Bennett and Makgala, 2009; Cantwell, 2015; Setlhabi, 2014). More than half of the Bakgatla migrated into Bechuanaland Protectorate (modern Botswana), in 1871, fleeing the authoritative leadership of Paul Kruger in Transvaal (Cantwell, 2015, p. 258). They were led by *Kgosi* (chief) Kgamanyane into Botswana (Cantwell, 2015, p. 258). On their arrival in Botswana, the Bakgatla were allocated land in Molepolole in Kweneng District (see Figure 2.1) before relocating to Mochudi (Setlhabi, 2014, p. 459). Traditionally, the *Bakgatla* were essentially farmers. Their tribal language is called *Sekgatla*. Mochudi is in the Kgatleng District, which is the selected area of case study (shown in Figure 2.7 in Section 2.2.4).

The *Bakgatla* tribe are well known for practising their traditions and customs (Grant, 1984; Schapera, 1994; Schapera and Roberts, 1975). For example, they are one of the few tribes that still practice initiation (commonly known as *bogwera* (for men) and *bojale* (for women) (Setlhabi, 2014, p. 459)). It is a practise where men and women live in a

secluded and secret place in the bush, and are initiated into adulthood by teaching theier traditional and cultural way of living (Grant, 1984; Setlhabi, 2014). Another cultural significance of this practice is that only those that have been through the initiation are allowed to speak during *kgotla* (tribal gatherings' place) meetings or other important social events such as weddings (Schapera, 1994; Setlhabi, 2014). Figure 2.3 & 2.4 shows a view of a *kgotla* meeting.

FIGURE 2.3: A view of a *kgotla* meeting (August, 1963). *Kgotlas* are still the medium of information–sharing for government programmes even today. *Source*: (The National Archives, 1965a).

The Bakgatla who remained in Moruleng, in the North-West province in South Africa, still maintain strong kinship networks and family ties with those in Botswana (Cantwell, 2015, p. 258). For example, the Bakgatla's paramount Chief Kgafela Kgafela II, continues to provide leadership for residents on both sides of the border (Cantwell, 2015, p. 258).

FIGURE 2.4: A view of a *kgotla* meeting in Mochudi (1907). *Source*: (Grant, 1973, p. 6).

2.2.2 Climate and topography

Botswana lies at latitude 28° and 27° South and longitude 20° and 29° East, with an altitude of about 1000 m above sea level (CIA, 2013; Meteorological Services, 2015). The country is landlocked and situated about 675 km inland from the Indian ocean and 1025 km from the Atlantic (Meteorological Services, 2015). Botswana has an area of 581 000 m^2, roughly the size of France or Texas (Beaulier, 2003; Denbow and Thebe, 2006). The country is a semi-desert with hot and dry expanses of land (Ama et al., 2011, p. 52). Mochudi is in the hard-veld ecological zone (Ama et al., 2011, p. 52), and it is within rocky hills as illustrated in Figure 2.5.

(A) (B)

FIGURE 2.5: Mochudi is surrounded by hills and boulders.

Botswana has a warm and tropical dry climate with a semi-arid land (Botswana Tourism Organisation, 2015; Meteorological Services, 2015). Generally there are two seasons for most of the year, which is the hot and winter seasons (Botswana Tourism Organisation, 2015). It is hot and dry for the most of the year with a mean annual sunshine hour which varies from 8.2 to 9.7 hours/day (Botswana Tourism Organisation, 2015; Meteorological Services, 2015). The summer temperatures usually ranges between 38 °C to 44 °C (Botswana Tourism Organisation, 2015; Meteorological Services, 2015). The summer rains begin in October with light conventional showers and in December the season of heavier rainfall begins. It is the beginning of the wet season (November to March) that initiates the growth and reproduction of natural resources and by the end of the rainy season, food is more abundant (Botswana Tourism Organisation, 2015). Rainfall amounts vary considerably from year to year, with a mean annual rainfall from a maximum of 650 mm to a minimum of less than 250 mm (Meteorological Services, 2015).

2.2.3 Economic profile

Since independence and the emergence of diamonds in the middle of the 20^{th} century, Botswana has transformed from a low-income economy to an upper-middle income economy (Dwivedi et al., 2011). Despite Botswana being landlocked, which can be a disadvantage economically:

> "... between 1975 and 2005, Botswana achieved an average annual growth per capita GDP of 5.9% " (UNDP, 2008).

However, the Gross Domestic Product (GDP) decreased from 6.1 % in 2011 to 4.2 % in 2012 due to the global economic recession (Republic of Botswana, 2014b). In the past, agriculture contributed significantly to the GDP in Botswana (Ama et al., 2011, p. 52). In 1966, at independence, agriculture contributed 42.7 % to the GDP, which fell to 1.9 % in 2008 (Ama et al., 2011, p. 52).

Diamond-driven economic growth has allowed the country to undertake major infrastructural developments to improve the living conditions of people around the country (Leith, 2005; Solway, 2011). The increase in national development and economic opportunities led to improved access to healthcare, education, clean water and social infrastructure (Leith, 2005; Solway, 2011). This resulted in more settled communities with access to better services and resources (Leith, 2005; Solway, 2011). Furthermore, the improved access to cash in the economy led to increased access to modern building materials and technology, which has transformed the country's housing form and spatial configuration.

However, the spread of wealth in Botswana is uneven and relying on economic statistics models can be misleading (Mmopelwa and Lekobane, 2011, p. 17). Additionally, statistical data captures formal economic activities, whereas people in self-help housing depend on various informal activities for livelihood (Mmopelwa and Lekobane, 2011). However, this dissertation is not in a position to give a critical review on economic models but it is important to note these observations. Housing economics is an important area of research in housing that deserves a separate study on its own.

TABLE 2.3: Percent of household and their sources of income by current economic status and sex. *Source*: (Dwivedi et al., 2011, p. 31).

	Income								
	Agricultural			**Household**			**Cash/Inkind**		
Current Economic Status	**M**	**F**	**Both Sex**	**M**	**F**	**Both Sex**	**M**	**F**	**Both Sex**
Employee - Paid Cash	26.7	20.6	24.3	7.1	8.6	7.7	97.0	97.2	97.1
Employee - Paid Inkind	36.3	31.1	34.1	14.1	18.6	16.1	88.0	88.4	88.2
Self-employed (no employees)	35.9	44.2	39.9	18.8	50.7	34.2	92.8	91.0	91.9
Self-employed (with employees)	32.0	44.1	34.4	11.6	36.9	16.7	96.1	94.9	95.9
Unpaid Family Helper	51.9	42.5	47.8	14.6	31.9	22.5	74.4	86.3	80.3
Working at Own Land/ Cattle Post	65.0	56.5	62.5	16.2	22.9	18.2	76.8	80.4	77.9
Total	**33.0**	**28.2**	**31.1**	**9.4**	**15.4**	**11.8**	**93.4**	**93.8**	**93.6**

Table 2.3 shows the sources of income from the households in the 2011 population census report. The table reflects the informality of income which is prevalent in many households (Dwivedi et al., 2011). For example, the number of employees paid in cash (97.1 %), employees paid inkind (88.2 %), self-employed with no employees (91.9 %) and those working at their own lands or cattle post (62.5 %) is very high (Dwivedi et al., 2011, p. 31). The main reason for informal sources of income in villages is that they are allocated a smaller budget compared to cities for infrastructure and development projects every financial year (Republic of Botswana, 2015). Therefore, there are less economic opportunities to provide formal employment. Consequently, these communities depend mainly on informal employment or informal home based economic activities as indicated in Table 2.3. Unfortunately these incomes are not regular or enough to qualify for housing mortgage. It leaves a majority of people with self-help housing as their only option. It is for this reason that innovative design strategies and housing models are needed for these communities. Figure 2.6 indicates some of the economic activities that people sustain themselves with.

(A) Women selling their products (1963). *Source*: (The National Archives, 1965a).

(B) Selling windows made at home backyards (2015). *Source*: Author.

FIGURE 2.6: Informal economic activities are the main sources of income in urban villages.

2.2.4 Mochudi - Study area

Mochudi has been established as a community since the nineteenth century and is the main center in Kgatleng District (Grant, 1973; Silitshena et al., 1990). Mochudi is only 40 km north east of the capital city, Gaborone (see Figure 2.7). Mochudi, like many urban villages near cities, has undergone substantial economic transformations and demographic changes (Silitshena et al., 1990). The population of Mochudi has an annual average growth rate of 2.41 %, caused mainly by migration and second-home owners (CSO, 2013). Mochudi attracts a large number of the recently arrived urban poor as it offers a lower cost of living than Gaborone (CSO, 2013). As a result of the population increase, there are more housing developments, economic activities and cultural exchanges taking place. However, these developments are unregulated and unmonitored, which has a significant impact on the quality of housing, the character of the place and the culture of the people.

The people in Mochudi, known as Bakgatla, are generally pastoralists (Schapera, 1994; Silitshena et al., 1990). Historically, they were engaged in agricultural activities, particularly cultivation and cattle keeping for subsistence needs (Silitshena et al., 1990). Figure 2.8 is an example of some of the agricultural activities observed during a site visit in September 2013.

Mochudi's proximity to the capital city, Gaborone, makes it an attractive place for those that cannot afford expensive accommodation in the city. Transformations in housing in Mochudi can generally be attributed to the cash economy and a desire for modern life (Larsson, 1996). Figure 2.7 shows the geographical location of Mochudi and other settlements in the Kgatleng District. Figure 2.9 shows the building footprints, densities

FIGURE 2.7: Kgatleng District and its settlements with Mochudi is the main center. Mochudi is 40 km north-east of the capital city, Gaborone. Map from *Source*: (Department of Surveys & Mapping, 2013).

(A) Raising chickens. (B) Rearing goats. (C) Vegetable garden.

FIGURE 2.8: People grow vegetables, raise chickens and rear goats in the present day Mochudi.

and land use patterns. Mochudi is located between hills and a river as indicated in Figure 2.10.

FIGURE 2.9: The building footprints in Mochudi: Map reproduced from *Source*: Department of Surveys & Mapping (2013).

The *Kgatla*[1] emigrated from Transvaal in the 1870s as they were fleeing from attack (Wood, 1976, p. 189). The hills provided a place for protection and defence against attack. They settled in a place suitable for grazing and farming (Wood, 1976, p. 189). The river provided a water supply for daily use and for farming (Wood, 1976).

Before settling in a new place, it was a tradition that the Chief's *(Kgosi)* place be located first (Schapera, 1994; Schapera and Roberts, 1975). Usually this was on top of the mountain for security and social status; being above everyone else (Schapera, 1994; Schapera and Roberts, 1975). Those close to the chief would then be allocated land next to the *Kgosi*. Figure 2.11 shows the location of the *kgotla* in Mochudi, with wards of those close to the chief at the bottom of the mountain (Schapera and Roberts, 1975). Figure 2.4 is a *kgotla* meeting in 1907 (Grant, 1973, p. 6). The *kgotla* is still an important political and administrative forum for official government businesses (Grant, 1973, 1980; Schapera, 1994).

This is only a brief introduction of Mochudi as a case study. Chapter 5 presents key findings of the case study research as conducted in Mochudi.

[1]The *Kgatla* means *Bakgatla*; another term referring to the tribe in Kgatleng District.

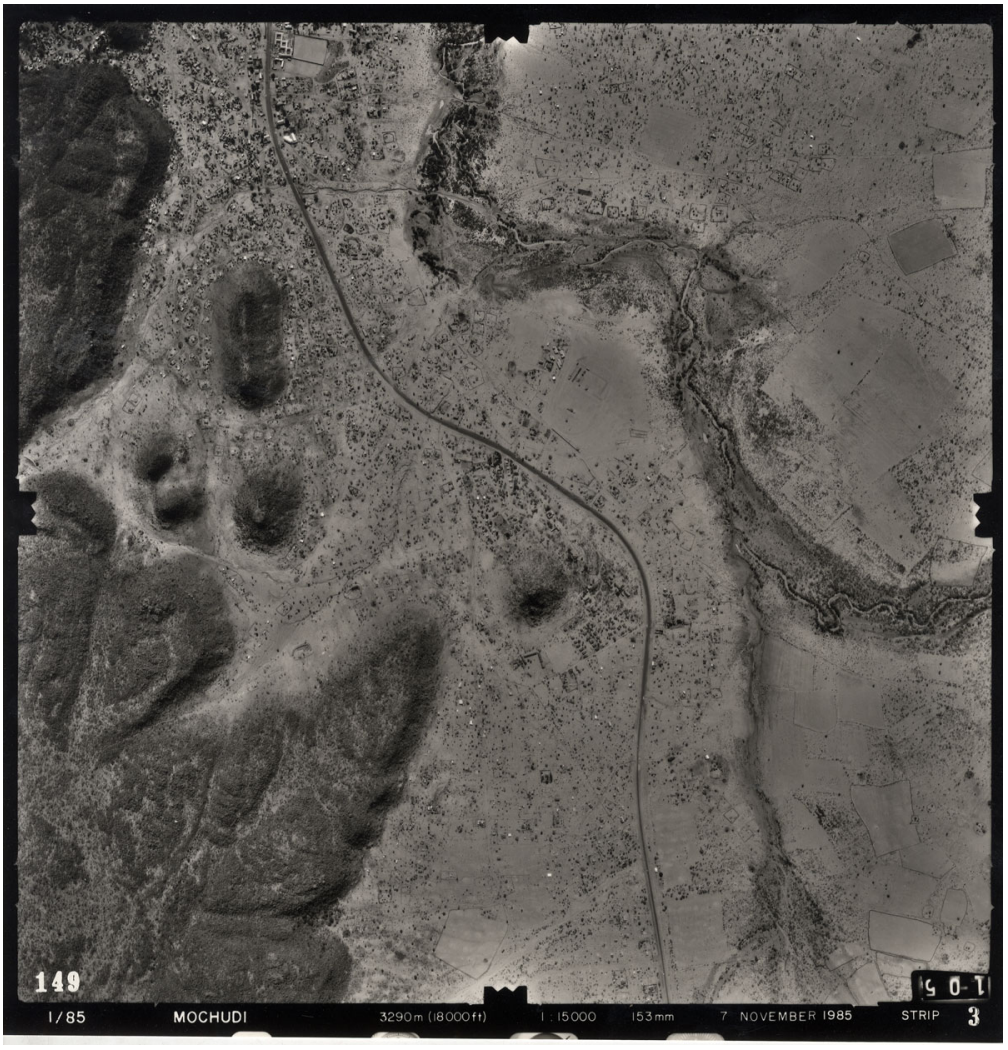


FIGURE 2.10: The village of Mochudi was located between a river for water supply and a mountain for security and defence. *Source*: (Department of Surveys & Mapping, 2013)

FIGURE 2.11: The village kgotla and the Chief's place is located on top of the mountain for security and social statues. *Source*: Department of Surveys & Mapping (2013).

2.3 House forms and spatial patterns

The study of settlement and dwelling patterns identifies and reveals factors that affect behaviour and social structure, spatial patterning, household economy and gender relationships in communities (Hillier and Hanson, 1984; Kent, 1990; Steadman, 1996). This also helps in the examining, analysing and modelling of built form and spatial organization (Hillier and Hanson, 1984; Steadman, 1996). The aim for this study is to identify and re-establish appropriate cultural and social meanings of Tswana traditional architecture and incorporate them into a self-help housing model. Therefore, traditional Tswana architecture forms and spatial use are an important basis on which to develop an appropriate design strategy for current and future housing.

2.3.1 Settlement Patterns and Housing Typologies

Informal or traditional Tswana settlements are planned around core structural elements, to meet the basic needs of survival (Hammami, 2012; Larsson and Larsson, 1983). Their basic needs are usually shelter for protection, access to water and food, which then influence settlements patterns and location (Larsson and Larsson, 1983; Rapoport, 1982). Several researchers in traditional Tswana architecture, Larsson (1996; 1983) and Hammami (2012) for example, observe that traditional settlements are composed of four levels or centres of social organization depending on their social function and political role. The four levels of physical and social structural organization in a typical Tswana settlement as identified by Larsson and Larsson (1983) and Hammami (2012), are: on the first level; the *kgotla* at village scale, which is an important place for conflict resolution and political forum; second level is the ward composed of patrilocal group of families headed by a sub-chief (headmen); on the third level is a group of several households, their children and dependants, and occasionally includes relatives; on the fourth level is the household, which is a basic social unit composed of only a man, his wife (or wives in some cases) and their children. Hammami (2012) and Larsson (1996; 1983) believes that the centres are an essential spatial and structural organization for a village to function well both politically and socially.

Figure 2.12 demonstrates the spatial patterns and hierarchical ordering of a typical Tswana settlement (Hammami, 2012, p. 265). It reflects the social and political structures of Tswana communities. It also shows the hierarchical ordering of space as a reflection of the social and political structure of a typical Tswana village (Hammami, 2012; Larsson and Larsson, 1983). The hierarchical organization of Tswana settlements into autonomous wards allowed traditional villages to function efficiently both socially and

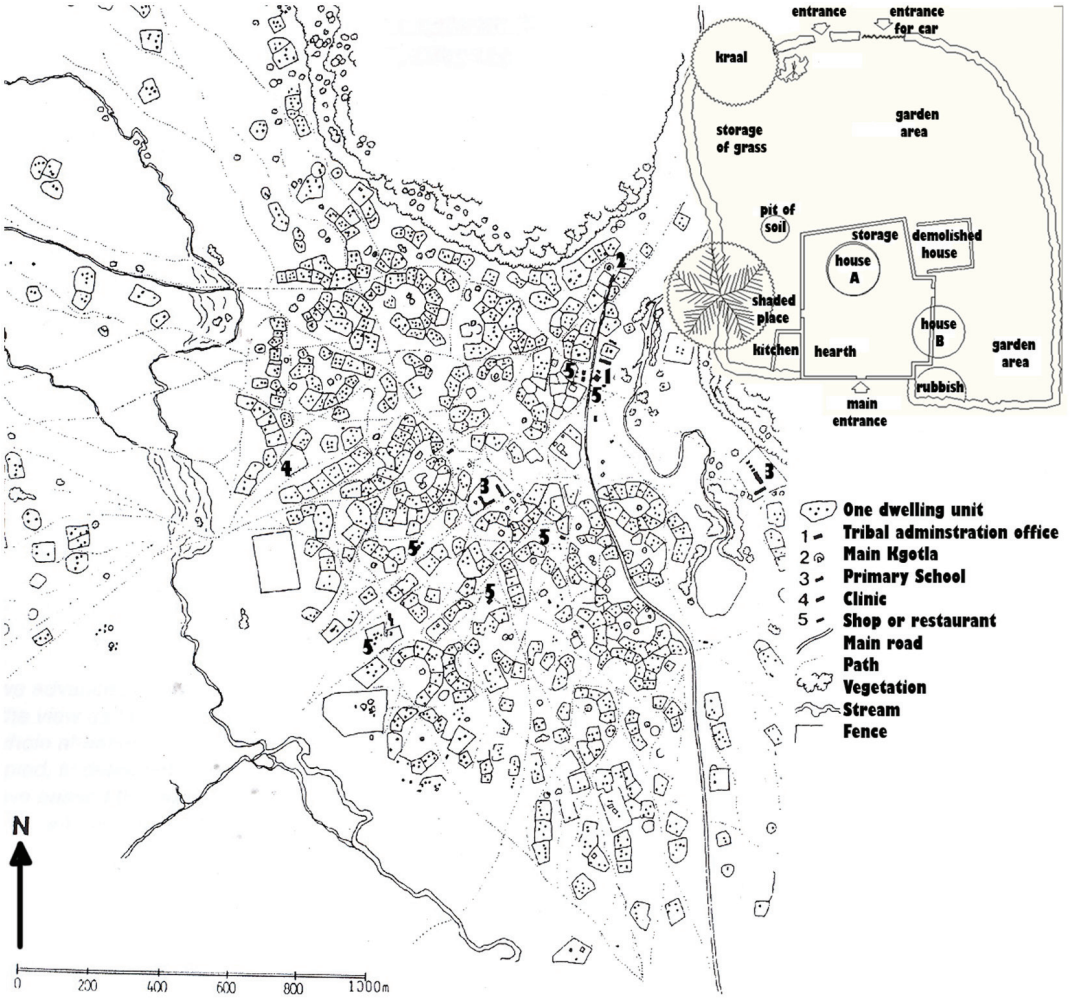


FIGURE 2.12: Shoshong map showing a typical traditional settlement in Botswana. It shows a clear pattern of social order, political organization and ordering of space in the built environment. *Source*: Hammami (2012, p. 265).

politically (Hammami, 2012). The autonomy of wards within a village set-up allowed people to have a sense of belonging and pride towards their place (Schapera, 1994; Schapera and Roberts, 1975). As a result the roles and responsibilities of each individual, household, ward and the community at large were well defined and known in traditional settlements (Schapera, 1994; Schapera and Roberts, 1975). Every member of the community was empowered to make decisions in some capacity at various levels.

Figure 2.13 is a drawing of a typical Tswana ward composed of twenty-three compounds (Fewster, 2006, p. 72). The compounds are made up of 1-4 patrilineal families (Fewster, 2006; Larsson and Larsson, 1983). The clusters of compounds are oriented towards the central courtyard.

This section presented the built environment at the scale of a settlement (village). The

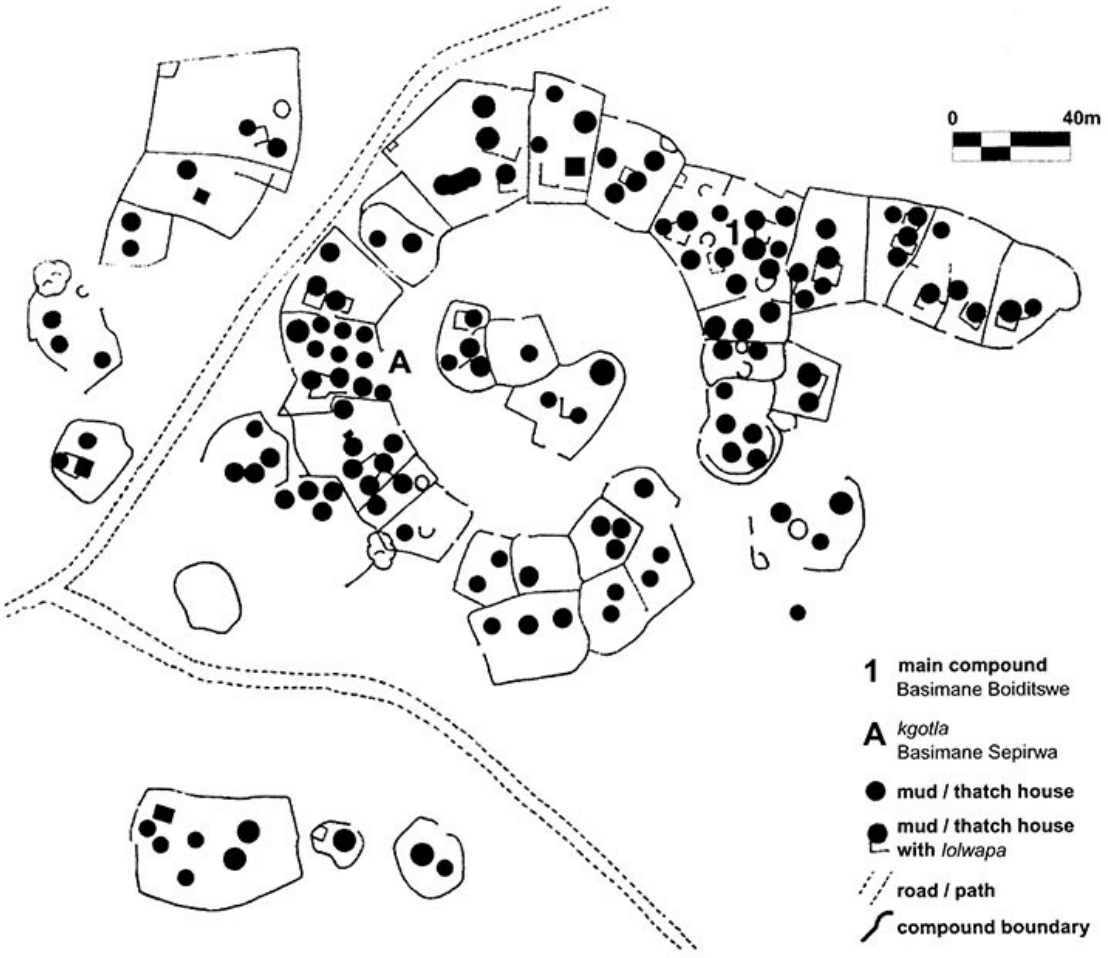


FIGURE 2.13: A typical Tswana ward (Basimane ward in 1969) reflecting a kingship layout of patrilineal families. *Source*: (Fewster, 2006, p. 72).

following section presents the built environment at the scale of a dwelling (house), which is the focus of this study.

2.3.2 House form, spatial organization and space use

According to literature Botswana does not have a significant number of traditional and vernacular buildings that can be identified as Tswana architecture Larsson (1996; 1983). Much of what is referred to as Tswana architecture is mostly limited to a traditional hut organized around a courtyard space as illustrated in Figure 2.14 Larsson (1996; 1983).

Figure 2.14 and 2.15 shows that both traditional and modern Tswana dwellings are built using simple and repetitive geometric forms. They reflect a typical traditional Tswana dwelling typology, with discrete housing units. The houses are connected by courtyards *(lolwapa)* and verandahs as outdoor transitional, social and functional spaces (Larsson, 1996, p. 112). Table 2.4 shows that in rural and the urban contexts, the detached modern

(A) (B) (C)

FIGURE 2.14: Traditional Tswana huts in 1963–4. *Source*: (The National Archives, 1965a).

FIGURE 2.15: Modular organization of single storey detached housing; a continuation of traditional Tswana housing patterns.

housing dominates with traditional housing decreasing (Singh et al., 2011, p. 101). As already mentioned, the built area in Mochudi is of low density as shown in Figure 2.16.

(A) The old part of Mochudi. *Source*: (Department of Surveys & Mapping, 2013).

(B) The new part of Mochudi. *Source*: (Department of Surveys & Mapping, 2013).

FIGURE 2.16: The old and new part of Mochudi.

Figure 2.17 is an illustration of a typical household family composition reflecting the use of space and activities. The illustration also shows the hierarchical ordering of architectural space according to the cultural values and social needs of the occupants.

TABLE 2.4: Percent distribution of housing units by housing type 1991, 2001 & 2011 Censuses. *Source*: (Singh et al., 2011, p. 101).

	Rural			Urban		
Type of Housing	**1991**	**2001**	**2011**	**1991**	**2001**	**2011**
Traditional	87.00	44.51	32.15	32.3	5.99	2.93
Mixed	—	22.90	16.13	—	15.56	6.69
Detached	7.3	19.30	29.32	41.7	44.78	51.01
Semi-detached	0.9	2.14	3.02	—	5.4	5.41
Town House	0.2	1.42	0.70	—	3.86	2.59
Flats	0.08	0.08	0.17	1.80	1.41	2.27
Part of Commercial building	0.1	0.17	0.22	0.9	0.22	0.10
Moveable	—	2.25	1.6	—	0.51	0.22
Shack	1.0	2.28	3.5	—	1.28	0.68
Rooms	0.6	4.55	13.18	14.2	20.52	28.1
Shared	—	0.17	—	—	0.22	—
Other	—	0.01	—	—	0	—
Not stated	—	0.00	—	—	0.24	—
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Number of housing units	**135,326**	**209,474**	**193,379**	**140,883**	**195,232**	**357,567**

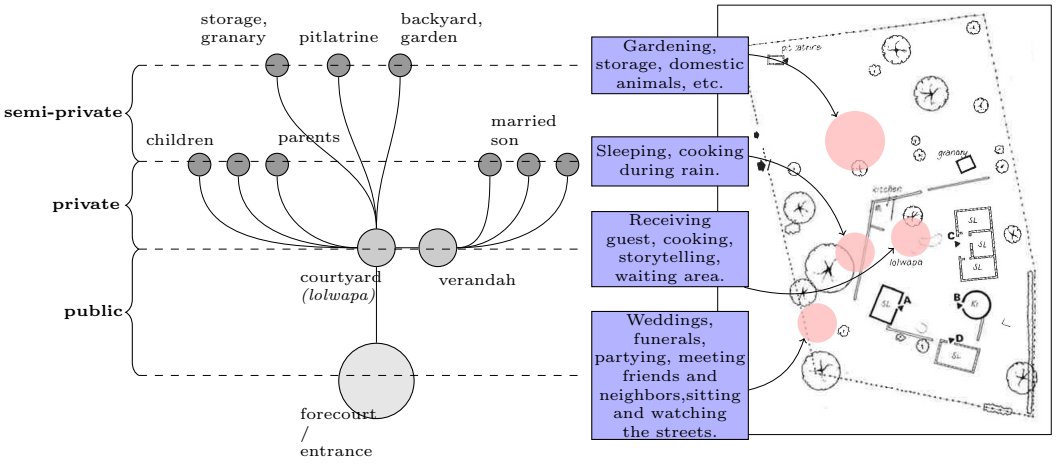


FIGURE 2.17: Spatial organization and space use of a typical Tswana household. *Source*: Adapted from Larsson (1996, p. 55).

Figure 2.18 are pictures taken during the fieldwork study in 2013. They reflect some of the lifestyle and social activities found in different households.

This section has demonstrated that the contemporary houses are based on repetitive forms composed of a basic number of housing types. This is a continuation of the traditional Tswana housing approach that was created using modular units to reflect the hierarchical social structure and spatial organization.

(A) Children playing soccer.

(B) A woman in the kitchen

(C) People resting and talking

FIGURE 2.18: According to Hanson (2003), dwelling's purpose is mainly to provide a place to sleep, cook, eat, bathe, entertain, store, etc.

2.4 Housing challenges in Botswana

Botswana, like many other developing countries is facing serious economic and social problems such as a high unemployment rate, high illiteracy, poor health and a general low quality of life (Malepa, 2011; Malepa and Komane, 2011). These social and economic challenges usually take priority over the government political agenda over housing needs (Mosha, 2013). Unfortunately, academic and political interest in housing research in Botswana is also limited. This has led to little published work on housing research, policy evaluation reports and generally scattered and inconsistent information data (Mosha, 2013). This view is also shared by other researchers who have attempted to study housing in Botswana's social and cultural context (for example see Datta, 1996; Dumba and Malpass, 2000; Gwebu, 2003; Mosha, 2013). Most of the useful published literature and official statistics are available mainly for larger cities and towns. However, the challenge with national statistics data is that it is generalized and does not accurately represent the social and cultural dynamics of informal settlements (Dwyer et al., 1975, p. 6). There are also relatively few, if any, built precedents for an in-depth case study of housing in Botswana. It is for these reasons that this study relies largely on available literature and case study research on housing in countries of similar economic and social background as Botswana. It is supported by empirical studies of Mochudi.

Some of the clear examples of unreliable data is the inaccurate description of places as cities, towns or villages based on the population statistics (Mosha, 2013). Some villages, for historical reasons constitutes large tribes, which qualifies them to be towns or cities according to the population statistics criteria (Mosha, 2013). However, these would be an inaccurate reflection of such settlements' social and cultural dynamics. This goes to show that one cannot make meaningful conclusions based on statistical data alone but that it should be augmented with qualitative data (Dwyer et al., 1975, p. 8).

This section introduced the general housing challenges in Botswana; from economic, social and political factors. The next sections would highlight the challenges caused by

housing policies, financing, land administration, design approach, construction processes, building materials as well as building technology.

2.4.1 Housing policies, land management and financing

The Botswana government, like many in developing countries, is more focused on national policies and infrastructure development[2] with housing at the bottom of the priority list (Hamdi et al., 1995; Republic of Botswana, 2014b). Figure 2.19 is an example of challenges faced by the government to provide and maintain infrastructural services. In addition, Botswana does not have a legislative or regulatory framework to guide individuals' housing initiatives as observed by Mosha (2013, p. 140). This has led to housing developments that are unregulated and spontaneous, many of which are unhealthy and environmentally unfriendly (Singh et al., 2011).

(A) Unhealthy pitlatrine

(B) Dirty drainage system

(C) Drinking water

FIGURE 2.19: The government's resources are spent on providing and maintaining infrastructural services rather than housing.

There are numerous housing initiatives that exist in Botswana[3], but for the purpose of this research, it is only necessary to discuss self-help initiatives which are economically and socially feasible for the majority of people. These discussions will briefly explore the legal, political and policy constraints upon self-help housing strategies practised in contemporary Botswana.

There are two important organizations that were established by the government to provide housing to the citizens: Botswana Housing Corporations (BHC) in 1970, and Self-Help Housing Agency (SHHA) in 1973 ((Dumba and Malpass, 2000, p. 140); (Republic

[2]The Republic of Botswana (2014b) Budget Speech, the government pledged to continue investing in key infrastructural facilities and programmes such as serviced land, energy, water, transport and communications. It is seen as a strategy to promote private sector investment that is necessary for economic growth and employment creation (Republic of Botswana, 2014b, p. 13).

[3]For example, Botswana Housing Corporation (BHC), which is a parastatal corporation solely owned by Botswana Government. BHC is a major housing provider for government, private companies and individuals. There are also efforts by private property companies and individuals to provide housing, but their contribution is insignificant compared to self-help housing processes. The President, Ian Khama, has also set-up a *Presidential Housing Appeal Scheme* in an effort to alleviate housing problems faced by poor people in low-income communities around the country (Khama, 2008).

of Botswana, 2014c)). BHC is a parastatal whose mission is to provide housing to both government employees and private individuals for rental or purchase (Dumba and Malpass, 2000; Mosha, 2013). SHHA is a housing policy whose main objective is to provide decent shelter to rural villages and people in the low and middle income bracket of P1 000.00 (£67) to P3 033.00 (£205) (Republic of Botswana, 2014c). There are two components of SHHA housing programmes as outlined by the Department of Housing; Loan Improvement and Turn-key Loan schemes (Republic of Botswana, 2014c).

- SHHA Loan Improvement is meant to finish, renovate or extend the existing structure. The maximum is P45 000 (£3 000) with repayment period of 20 years at 0% interest, or 10% interest for defaulters.
- Turn Key Loan is P60 000 (£4 000), also with the same repayment conditions as above. In this scheme, the council (now under BHC) builds the house and gives the client house keys.

As it will be discussed in the literature review in the next chapter, one of the major benefits of the aided self-help housing programs of the 1970s was to place key decision-making responsibility in control of the inhabitants (Turner, 1977, p. 89–101). However, in 2009, the government transferred SHHA's turn key housing programme from the local councils to BHC, which effectively took away the autonomy of self-help housing to provide dwelling for themselves. The bureaucratic control of BHC's systems and preference for high building standards, makes the financial costs and human resources required for housing prohibitive (Singh et al., 2011). High administration and construction costs means there is less money to spend on the actual house itself. As a result, the program has to be heavily subsidized by the government for it to be successful, making the whole process uneconomic and unsustainable. These are some of the challenges faced by self-help housing initiatives in developing countries (Hamdi et al., 1995; Turner, 1977). It is however useful to note these challenges in the context of Botswana, which are: people in low-income communities and the urban poor have low purchasing power to repay housing loans, which results in high default rates; high building standards make the costs unaffordable; the economic situation forces governments to prioritize on infrastructural development rather than housing; people selling their land to generate income rather than aspire for home ownership (Dumba and Malpass, 2000; Mosha, 2013).

A majority of people in Botswana earn below the minimum requirement to qualify for the SHHA schemes, that is; P4,400 (£300) per annum, which translates to P366.67 (£25) per month (Mosha, 2013, p. 147). Those who earn between P3, 033 (£200) and P4, 200 (£277) per month are also excluded from the SHHA sheme (Mosha, 2013, p. 147). The majority of the population falls in this group which automatically means they do not

qualify for a commercial bank loan either, effectively excluding them from all forms of financial assistance. Table 2.5 shows that 52.7 % live in self-help housing and 25.3 % rent from houses owned by individuals. This is a significant number of people that depend on their own limited resources to house themselves.

TABLE 2.5: Percentage of housing units by housing tenure and type of residence, 2011 Census. *Source*: (Singh et al., 2011, p. 104).

Housing Tenure	**Urban**	**Rural**	**Total**
Self-built	40.98	74.48	52.74
Rent: Individual	36.57	4.46	25.3
Rent: Central Government	4.28	3.36	3.96
Free: Inheritance	2.2	1.88	2.08
Purchased	2.16	0.41	1.54
Rent:Company	2.85	0.38	1.99
Rent: BHC	1.72	0.01	1.12
Rent: Local institution	1.44	1.27	1.38
Rent: VDC	0.37	1.17	0.65
Donated	0.28	1.01	0.54
Do not know	0.23	0.39	0.29
Housing Units	**357567**	**193378**	**550945**

At policy level the SHHA programmes have been successful, with more than 60 % of the population having access to housing (Mosha, 2013, p. 147). Despite its successes, there are critics who believe that the scheme is heavily subsidized with poor cost-recovery performance (for further discussions see Datta (1996); Dumba and Malpass (2000); Mosha (2013)). However extensive literature exists on housing policies and housing financing with only a brief review given here. Housing policy-makers, practitioners and academics have also explored other strategies such as easier ways of accessing financing, land ownership and infrastructure development which are all important but not easily achievable without major institutional changes such as national policies, land administration and financial institutions (Bailey, 1977; Habraken and Valkenburg, 1972; Hamdi et al., 1995; Turner, 1977). This work will not contribute to the disagreements and debate on policies and financial models, but rather focus on housing design theory.

Despite the small population and availability of land in Botswana, the demand for land in cities and urban villages is higher than the supply (Collin and Bornegrim, 2010; Kalabamu, 2000). This has led to serious land shortages which impact negatively in housing affordability (Kalabamu, 2000; Ministry of Lands and Housing, 2016). Land and housing policies are too complex to be covered in such a short section and yet are critical in housing research. It is important to briefly discuss land and housing policies so as to give an overview of housing challenges in Botswana.

Traditionally, Batswana[4] have always practised a tripartite land system (Hardie, 1981; Schapera and Forde, 1953). They had residential land (settlement) for homes; arable land (farm) for growing food, in the second zone; and grazing land (cattle post) for animals, in the outer zone (Hardie, 1981; Schapera and Forde, 1953). The division of land also led to different responsibilities aligned to gender, with males responsible for the cattle post and females responsible for ploughing the fields (Kinsman, 1983; Schapera and Forde, 1953). After independence the government adopted a new statutory land tenure system to complement the customary tenure systems, resulting in a dual land system (Adams et al., 1999).

The Colonial government divided land into three land tenure system; the State Land, Freehold Land and Tribal Land (Saugestad, 2001). Tribal land, which according to (Adams et al., 1999), was 49 % of the country's total area at independence, is important in self-help housing. Due to population pressure and shortage of land, some of the State land has been allocated for tribal use such as agriculture and human habitation (Adams et al., 1999). Over the years, tribal land has been increased to cover over 70 % of the country (Adams et al., 1999). A major disadvantage in housing is that tribal land cannot be sold or mortgaged, and this has a major influence in housing development (Kalabamu, 2000, p. 307).

The demographic study in Section 2.2 shows that the population has increased significantly over the years. This has led to more pressure on land availability. Consequently, the new plots are significantly reduced compared to traditional plot sizes. In such a small piece of land, it is no longer possible to build houses that are separated and spread all over the yard as the space is not available. There is need for a greater compositional strategy of building forms and spaces. These are new challenges in Botswana that require a different approach to the traditional planning and design methods.

2.4.2 Design and construction processes

More than half the population in Botswana build their houses through self-help initiatives, that is, without any external professional help or financial assistance (Mosha, 2013). This is largely due to a lack of sufficient funds to properly finance a decent modern home as illustrated in Figure 2.20. The other challenge is the general lack of design skills in climate responsive housing (Larsson, 1996; Mosha, 2013). As a result, the new houses are an economic and environmental burden because they are unsuitable for hot climates (Larsson, 1996).

[4]Plural term used to refer to people in Botswana

(A) Crowded housing.

(B) Design not in context.

(C) Outdoor kitchen.

FIGURE 2.20: Lack of a design framework leading to unregulated densification of housing, unused leftover spaces, inadequate sanitary, poor ventilation and lack of access to natural light.

As stressed thus far, the major challenge in self-help housing is that they are not initially designed for future growth even though it inevitably happens Turner (1977; 1972). Designing for an unpredictable, uncertain and continuously changing needs takes a lot of skill that requires a good strategy Hamdi (2010; 1995). It is for this reason that this study set out to explore flexible and adaptable design processes that should provide guidance for a design decision-making processes in self-help housing.

2.4.3 Building materials and technology

Currently, many houses are built of industrially-produced building materials (see Table 2.6) and mostly organized following modern patterns of living. This is arguably the 'new vernacular architecture' as it reflects the cultural values and aspirations of the current dwellers. However, a study by Larsson (1996; 1983), on the transformations of Tswana houses over a ten year period, concluded that even though people still prefer the traditional way of building houses, they continue to build modern houses for social status and functional needs. While one cannot deny the economic and social benefits of industrial materials and building methods, this study proposes that it is more important to build houses that reflect their social needs and economic situations.

In traditional Tswana societies, the building of houses involved mostly family members only Larsson (1996; 1983). The houses were simple forms following a common theme. Figure 2.21 shows that traditionally, both men and women were involved in the construction of a house. They also sourced materials locally. However, this approach is no longer possible, with the pressures to build quickly for a generation that continuously changes its values (Larsson, 1996; Singh et al., 2011). The field studies and literature review revealed that technological and economical changes play a major part in changing housing design and construction methods as indicated in Table 2.6. Unfortunately the

TABLE 2.6: Materials used for the construction of floors, roofs and walls for housing; 1991, 2001 and 2011 Censuses. *Source*: (Singh et al., 2011, p. 105).

Materials of Construction	**1991**	**2001**	**2011**
Floor			
Cement	57.7	78.16	86.9
Mud	35.9	18.01	10.4
Others	6.4	3.83	2.7
Roof			
Corrugated Iron	49.6	68.88	86.4
Thatch	41.2	22	11.8
Others	9.2	9.12	1.8
Number of housing units	**276,209**	**404,706**	**550,946**

new forms and construction materials are not considered within Botswana's climatic and economic contexts.

(A) Women build, plaster and decorate the walls and floors using mud. *Source*: Grant and Grant (1995).

(B) Women were responsible for the regular maintenance of the houses. *Source*: (Larsson, 1996, p. 64).

(C) Men build the roof structure, at times they do the thatch as well. *Source*: (Larsson, 1996, p. 15).

FIGURE 2.21: Building and maintaining a house in traditional Tswana self-help housing is aligned to gender and age.

2.5 Change and transformations

Change, transformations, spatial organization and the urbanization of Botswana's dwellings and settlement patterns is widely researched and well documented (Larsson, 1996; Larsson and Larsson, 1983). There is an abundance of historical literature for urban villages, especially those near cities such as Mochudi (for example see the works of Larsson

(1996; 1983), Silitshena et al. (1990), Schapera (1994) and Grant (1973, 1980)). These studies do not attempt to address housing challenges but nonetheless provide important knowledge that can be used as a basis to develop design strategies for housing in Botswana. For example Schapera (1994; 1975), an anthropologist, has written extensively on the cultural and traditional practices of people in Mochudi without particularly focusing on architectural design. However, his studies reveal cultural practices that this research is heavily indebted to.

Recently, there has been an attempt to study housing transformations, densities and land use patterns but mainly in formal settlements where data is readily available (Larsson, 1996; Lesetedi, 2011). There is little research on self-help housing, despite it being the main housing method for the majority of the population. Table 2.7 shows that the housing units in Botswana are mostly self-built (Lesetedi, 2011, p. 92). It is followed by rented housing units from individuals, which are also self-built (Lesetedi, 2011, p. 92). This study relies on Larsson (1996; 1983), Schapera (1994; 1975), Grant (1973, 1980) and many others who have done work on the history of Mochudi as a basis to develop a design strategy for current and future housing needs.

TABLE 2.7: Tenure of Housing Unit by Sex of Household Head. *Source*: (Lesetedi, 2011, p. 92).

	Sex of Household Head				
	Male		**Female**		
Tenure of Housing	**No.**	%	**No.**	%	**Total**
Self-built	134,259	46.4	156,300	59.8	290,559
Rent individual	83,646	28.9	55,757	21.3	139,4.5
Job-related (free)	29,738	10.3	16,595	6.3	46,333
Rent Central Government	11,066	3.8	10,736	4.1	21,802
Free: Inheritance	6,150	2.1	5,332	2.0	11,482
Purchased	5,129	1.8	3,374	1.3	8,503
Rent: Company	8,189	2.8	2,757	1.1	10,946
Rent: BHC**	3,503	1.2	2,662	1.0	6,165
Rent: Local institution	3,523	1.2	4,079	1.6	7,602
Rend: VDC**	1,779	0.6	1,797	0.7	3,576
Donated	1,380	0.5	1,585	0.6	2,965
Do not know	998	0.3	590	0.2	1,588
Total	**289,360**	**100.0**	**261,566**	**100.0**	**550,926**

***Botswana Housing Corporation (BHC), Village Development Committee (VDC)*

Communities in different villages in Botswana have been undergoing rapid housing transformation, both physically and culturally (Larsson, 1996). Mochudi reflects the

typical challenges of urban villages in Botswana experiencing significant economic and population growth due their proximity to the capital city, Gaborone. Housing transformations in these communities show that people selectively borrowed and adapted urban designs and construction ideas, tools and techniques for their own housing needs (Larsson, 1996; Sebina, 2004). Larsson (1996; 1983) have extensively documented and analyzed transformations in thirteen rural dwellings in four different villages in Botswana over a period of ten years. Their study of the dwellings gives a detailed historical background and transformations of settlement's organization in Botswana. The studies were in four villages, namely, Mochudi, Oodi, Shoshong and Gabane (Larsson, 1996; Larsson and Larsson, 1983). The dwellings were documented for the first time in 1982/3 and revisited in 1993 for a follow-up documentation (Larsson, 1996; Larsson and Larsson, 1983). According to Larsson (1996, p. 57), the dwelling transformations:

> "... illustrate various ways to improve and modernize traditional dwellings without any government support and in a situation where no regulations are imposed".

The studies concluded that transformations have brought a total collapse to traditional Tswana architecture; people are not in control of their own identity (Larsson, 1996; Larsson and Larsson, 1983). They observed that the traditional houses were demolished against the wishes of the elderly (Larsson, 1996). This was because of the pressure from the young generation, who are generally the main financiers (Larsson, 1996). They also observed new rectangular buildings of concrete blocks and corrugated galvanized steel sheets roofs in the households that they studied (Larsson, 1996; Larsson and Larsson, 1983).

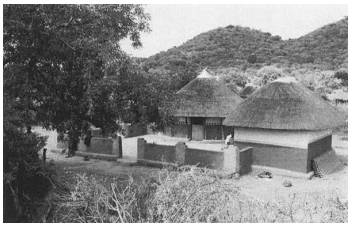
Figures 2.22a and 2.22b show that modern housing typologies use industrial materials that have replaced traditional typologies and materials (Figure 2.22c) which are becoming scarce. The other reason for using industrial materials is to meet the demand of the new generation with different social values (Larsson, 1996). During the field studies in Mochudi in 2013, we observed both rectangular modern houses and traditional circular mud-walled thatched huts in many compounds (see Figure 2.23). Modern materials are perceived as more durable than traditional materials and are also a sign of prestige in society. Similar observations were made by Prussin (2002), in her study of African architecture in West Africa, that rectangular houses are built mainly for social status. The challenge in housing has always been about providing a quality living environment to meet people's social and cultural needs, not so much about the choice of materials or building technology (Lawrence, 2000; Oliver, 2010; Rapoport, 1969b). Habraken and Valkenburg (1972) argue that modern materials and technology were never meant to replace housing as a process.

(A) An example of a new housing typology popularly known as a 'Castle'. *Source*: Author.

(B) An example of another popular housing typology known as 'Two and Half'. *Source*: Author.

(C) A traditional dwellings connected by a low-wall courtyard. *Source*: (Grant and Grant, 1995).

FIGURE 2.22: Many modern housing typologies (Figure 2.22a and 2.22b), are poorly designed and inappropriate to meet people's social and climatic needs. Traditional housing typologies (Figure 2.22c), were not only economically feasible but also culturally appropriate.



(A) Traditional dwelling. *Source*: (Larsson, 1996, p. 13).

(B) Adapted dwelling. *Source*: Author.

(C) Copied 'modern' dwelling. *Source*: Author.

FIGURE 2.23: The images illustrate continuity and adaptation of traditional architecture and the consequence of copying traditional forms without analysis and understanding.

This studies have demonstrated that the impact of the mineral-driven economy and the proximity of Mochudi to the capital city of Gaborone has led to changes and transformations in housing. The social needs, cultural values, perceptions and attitudes of people towards the meaning of housing has also changed over time. These are new housing challenges that need new design strategies which this study seeks to explore.

2.6 Conclusions

This chapter presented an account of Botswana's historical background, with carefully selected examples relevant to understanding self-help housing and design processes. This was only a brief introduction because there is extensive historical literature about Botswana that is well documented elsewhere (for example see Leith, 2005; Schapera, 1994; Tlou and Campbell, 1984). Botswana provides an interesting case study in housing as it faces challenges different from that of other countries. Unlike countries such

as neighbouring South Africa and Zimbabwe, Botswana is relatively underdeveloped with a significant number of people still living in rural settlements (Gwedu et al., 2011; Lesetedi, 2011). It is only recently that the country is experiencing land shortages and housing challenges in urban areas due to an unprecedented growth of population and urbanization (Gwedu et al., 2011; Lesetedi, 2011).

This research set-out with a desire to generate new forms of housing and to encourage traditional practices in architecture. To achieve this goal it was important to study the changes and transformations in housing in Botswana in general. It was found out that in the past people built houses as a way of expressing their desires, culture and tastes (Oliver, 2010; Rapoport, 1969b). At the same time spaces were designed to meet their needs both socially and environmentally (Fathy, 1986, p. 4–10). The new generation have developed more modern and different aesthetic values and living trends as compared to previous generations (Larsson, 1996, p. 62–63). The new houses are totally different from traditional Tswana huts, mainly because people do not want to be associated with 'archaic' living notions such as living in mud huts (Larsson, 1996, p. 65). However, this study maintains that there are lessons from traditional architecture that can be improved by "... redefinition, intervention and reinvention of processes..." (Till and Schneider, 2012, p. 39) in regards to design techniques in housing.

This study noted that some of the housing challenges Botswana faces are mainly due to little or no interest in housing research from both the government and academia. Consequently, this has led to a lack of a well-structured design framework and regulatory or legislative framework to manage and control the standard and quality of housing (Mosha, 2013, p. 140). These observations show that there is an urgent need for increased research and investment in housing policies to build adequate institutional capacity and knowledge. This will allow the country to address the complexities of housing challenges more effectively. This thesis proposes flexible housing strategies that enable communities that lack technical knowledge to improve the quality of their self-built housing by using the available resources (Till and Schneider, 2012, p. 42–43).

Chapter 3

Self-help housing and flexible housing

3.1 Introduction

This study is built on the pioneering work of other researchers such as Turner (1977; 1972) and Hamdi (2010; 1995). These researchers and practitioners have worked on self-help housing projects in different countries over the years. For example, the work of Turner (1977; 1972) who developed the theory of self-help housing while studying housing in Peru is key in understanding housing from a similar economic context to Botswana. Another notable work is that of Hamdi (2010; 1995), whose role as a professional designer, critic, urbanist as well as a policy maker led to important theories about user-participation in housing. His ideas of building social infrastructure as key factors in improving the quality of life for low-income communities are of interest to this study.

This chapter reviews and discusses the most influential and relevant housing concepts, and architectural design theories which relate to this study. The case study was carried out in Botswana, and the literature discussed here will have a particular bias towards concepts and studies in countries of similar cultural and economic backgrounds to Botswana. The literature review addresses the aims and objectives of this dissertation as presented in Chapter 1 with housing models and concepts presented in Table 3.1.

Table 3.1: Research aims and objectives with the respective housing concepts and models.

Research aims / objectives	**Housing models and concepts**
1. Understanding the beliefs and motivation of design processes associated with self-help housing communities in Botswana. Discussed in Chapter 2 **2.** Encourage housing that is rooted in Botswana's socio-cultural values and climatic conditions. Discussed in Chapter 2 and 3	*(Vernacular architecture).* Discussed in Section 3.2.
3. Identifying architectural forms and design spaces that people use to express their social values and cultural identity in self-help housing. Discussed in Chapter 2 and 3	*(Self-help housing and vernacular architecture).* Discussed in Section 3.2.
4. Encouraging self-help housing as a cost effective housing model in developing countries. Discussed in Chapter 3.	*(Self-help housing).* Discussed in Section 3.2.
5. Allow for user-participation and empowerment in housing processes. Discussed in Chapter 3 and 6.	*(Self-help housing and participatory design).* Discussed in Section 3.2 and 4.4.2.
6. Propose flexible housing as a strategy that minimizes initial building costs but maximizes future growth by offering possibilities to change and adapt to future use (Payne, 2006, p. 167). Discussed in Chapter 6.	*(Flexible housing and design).* Discussed in Section 3.3.

3.2 Dwelling (housing)

While design methods and theories are well established in the field of architecture, there is no particular field that deals with dwellings as a discipline (Oliver, 2010, p. 14, Kent, 1990, p. 1–2). For example, archaeologists are only interested in social structures and cultural relationships in the study of dwellings; while architects are mostly interested in the use of space, building materials and design methods (Oliver, 2010, p. 14, Kent, 1990, p. 1–2). It is important to give the meaning of housing to provide potential theoretical foundations for developing a socially appropriate design framework for self-help housing, within the practice of architecture and design theory.

3.2.1 Meaning and definition

> "All houses are dwellings; but all dwellings are not houses. To dwell is to make one's abode: to live in, or at, or on, or about a place ... dwelling is both process and artefact: it is the experience of living at a specific location and it is the physical expression of doing so" (Oliver, 2010, p. 15).

This definition of dwelling given by Oliver (2010) introduces the meaning of housing that will be the subject of this study. There are numerous theories and definitions about what dwelling actually is (Rapoport, 1990; Turner, 1977). The theory and meaning of housing is important to define, as housing transcends many cultures across the world, and many disciplines from the natural and social sciences as well as the humanities (Oliver, 2010; Rapoport, 1969b).

Both the meaning and quality of housing can be problematic as they largely depend on the sociological and geographical context of inhabitants, and also the interest of the researcher (Rapoport, 1969b, 1982). For this study, the process which includes the historical, sociological and cultural activities leading towards the physical structure of housing is as much important as the product itself (Hamdi et al., 1995; Oliver, 2010; Rapoport, 1969b; Turner and Fichter, 1972). Oliver (1987, 2010) and Rapoport (1969b, 1982, 1990) stress that both the physical and social structure of dwelling are critical. Ingold (2000) in his description of dwellings, uses ethnographic methods to study social activities and people's interactions with their environment. Turner (1977; 1972), Hamdi (2010; 1995), and Habraken (1985; 1972) suggest the user-centred approach in housing design process as a way of creating dwellings that meet people's needs. This demonstrates that housing can alternatively have different meaning depending on weather it is used as a noun or verb (Turner and Fichter, 1972, p. 151). Ultimately, the end product of housing as a process, a verb, ends up being a house as a product, a noun (Turner and Fichter, 1972, p. 151). Housing as a noun, involves mainly the quantifiable aspect of housing such as construction costs, material applications, light, ventilation and thermal comfort which are important as well (Lawrence, 2000, 1987).

3.2.2 Cultural values and social needs in housing

This section discusses the struggles that architects face in reconciling the gap between the technical and social structure in architectural design (Habraken and Valkenburg, 1972; Rapoport, 1990). For example; movements in architecture such as the CIAM's

Charter of Athens[1] were fascinated by the modern technology and functional approach to housing rather than the social issues (Frank, 2012, p. 61). However, members of Team 10 (or Team X)[2] were concerned with the humanistic and social factors in architecture which were inspired by the vernacular cultures (Frank, 2012, p. 61). At the same time that CIAM and Team 10 were developing ideologies and experimenting with urban utopia and housing, Bauhaus[3] designers were developing minimum standards for housing (Ehn, 1998, p. 208). This was an attempt to integrate the two sides in the history of the humanistic Enlightenment: the hard (technology and natural sciences) with the soft (values, democracies, art and ethics) (Ehn, 1998, : 207–208). Unfortunately for the Bauhaus, only the natural science-based expectations were fulfilled (Naylor, 1985; Droste, 2002; Ehn, 1998, : 207–208).

Failures of the Bauhaus group and CIAM led to another group referred to as 'modern regionalism' (Frampton, 1983; Frampton and Futagawa, 1985). This group of architects were concerned about the climate and culture-specific architecture (Frampton, 1983; Frampton and Futagawa, 1985). Some of the notable names in this group are Fathy (1986, 2010), whose work in Egypt was inspired by the use of appropriate local construction techniques and knowledge, and local materials; Alvar Aalto designs based in the Finland climate (Schildt, 1994); Luis Barragan houses, informed by the climate and culture in Mexico (RiggenMartinez, 1996), as well as key works by Charles Correa (2000; 1996) in India; Tadao Ando (1996) projects in Japan; and other members of the 'modern regionalism'. These group of architects produced some of the most influential work in the history of vernacular architecture. Unfortunately, their traditional approach to design and construction fell short of the economics and social realities of the contemporary building industry (Frampton, 1983; Frampton and Futagawa, 1985). An example is Fathy (2010)'s infamous rehousing project in Gourna, a village in Upper Egypt near Luxor. Fathy (2010) attempted:

> "...to revive pre-modern traditions of building with handmade, sun-dried mud bricks, and to provide an alternative to mass-produced, reinforced concrete housing projects" (Pyla, 2007, p. 28).

[1]For further reading on CIAM (Congr'es Internationaux d'Architecture Moderne), see (Corbusier and Eardley, 1973; Gold, 1998; Marmot, 1981). CIAM was a modern movement formed in 1933 by a group of European architects (Frank, 2012, p. 61).

[2]Team X is a breakaway group from CIAM formed in 1959 (Kallus, 2014, p. 123). It was founded by a group of architects who were concerned about creating human environment that reference the past (Frank, 2012; Kallus, 2014).

[3]The Bauhaus School was founded by one of the Modernist architect, Walter Gropius in 1919 (Ehn, 1998, p. 208). This was an attempt to integrate art and modern technology in architecture and design (Ehn, 1998, p. 207–217).

The project failed for various reasons ranging from people not wanting to leave their source of income, and refusal to live in mud houses to sabotage by the construction industry controlled by government officials (Fathy, 2010; Pyla, 2007).

Many more 'ideologies' or 'movements' have emerged through the history of architectural theory. Perhaps the most prominent ones are the 'New Modernism'[4], who generally do not believe form follows function; the 'Archigram Group'[5], whose work is based on the most sophisticated technologies; and many others that came into prominence in the 1980s and 1990s such as the 'neo-Structuralism', with close connection to digital technologies. Many of these important movements did not have significant impacts on housing as their mechanistic or specialized design approaches failed to meet the expectations of diverse and unique housing challenges. Moreover, much of it is due to ill-defined housing problems and housing needs that cannot be solved by a design process based on reductive and systematized design criteria (Habraken and Valkenburg, 1972; Hamdi et al., 1995).

A book edited by Kent (1990); *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study*; is one of the few examples that attempts to investigate dwelling by bringing in scholars from a wide range of disciplines with interest in architectural form and socio-cultural research[6]. The book gives a critical review on the role of culture in the built environment, especially housing (Kent, 1990, p. 1–2). Also the work of Asquith (2005, p. 128–144) and Vellinga (2005, p. 81–94) in applying an integrated approach to housing offers critical analysis and methods of how lessons from the vernacular traditions can be applied to future housing research and design theory.

In the past social values and cultural identity in housing (vernacular architecture) were studied to describe, document and conserve historical and traditional buildings (Rudofsky (1964, 1977); Oliver (1997, 2010); Brunskill (2000)). The exhibition and publication of Bernard Rudofsky's book; *Architecture Without Architects*, at the Museum of Modern Art (MoMA) in 1964 and 1965, showing photographs and descriptions of buildings from many parts of the world, inspired many architects to research vernacular architecture (Rudofsky, 1964, 1977). The exhibition illustrated architectural buildings that were not common in mainstream architecture such as the religious towers in Iraq,

[4]See the works of Santiago Calatrava (Tzonis, 1999), Zaha Hadid (Hadid and Betsky, 1998) and Daniel Libeskind (Libeskind et al., 2001), whose building forms are not derived from function.

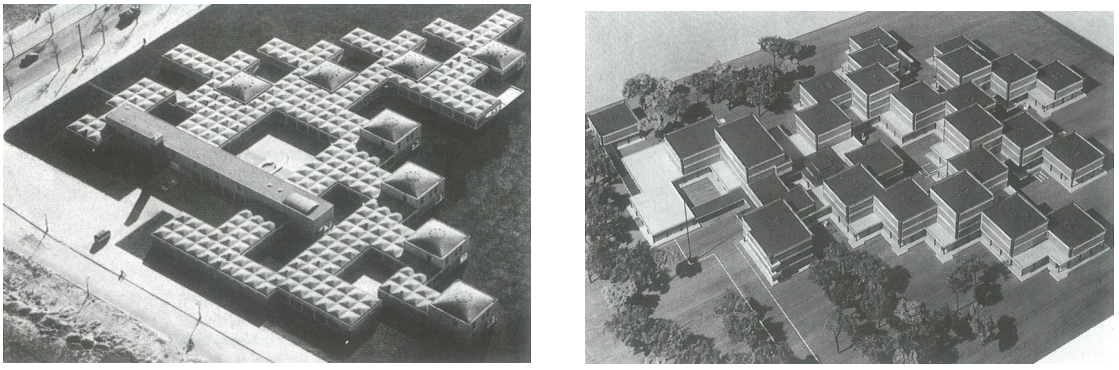
[5]Examples include the works of Norman Foster (Foster, 2009) and Richard Rogers (Serota et al., 2010).

[6]There are efforts by other researchers that attempts to integrate both the architectural form and social form but still fall short of the expectation of cultural complexities in housing. For example see *Holistic housing: concepts, design strategies and processes* by Drexler and El khouli (2012), the book provides a similar conceptual philosophy but focusing primarily on a system of criteria for optimising environmental sustainability in housing. Also see Habraken and Teicher (2000)'s analysis of the built environment based on the physical, biological and social paradigms. Also see UN-Habitat (2011a,b)'s description of what adequate housing is by providing a practical tool-kit for housing analysis.

Dogon houses in Mali, imaginative bamboo structures in the Gulf of New Guinea, gigantic mobile water wheel structures in Syria and others[7] (Rudofsky, 1964, 1977). However, the exhibition was later criticized for its superficial presentation of traditional architecture, lacking in critical research methods, and also for the lack of understanding of the processes that created the buildings (Oliver, 1997, 2010). This is a common problem with the study of vernacular architecture as illustrated by Oliver (1997) that:

> "...until a few decades ago interest in vernacular architecture was focused on the documentation and classification of traditional forms of houses"(Oliver, 1997, p. xxii).

So important is the role of culture in housing that Habraken (2000; 1972), Rapoport (1998), Christopher Alexander (1964; 1977) and many other critics have argued over the years that new building materials and technologies were never meant to replace the process of housing, which is a sacred process and a way of life. Habraken (2000; 1972) propose that we should take advantage of the advancement in technology (industrial processes), but cautions that we should still follow the natural process of designing and building housing that meets our social and environmental needs. Giancarlo De Carlo (1992) offers similar arguments that incorporating cultural values and social practices will greatly improve the quality of housing by giving people access to progressive design methods based on familiar practices (see Figure 3.1).



(A) Van Eyck's Weeshuis orphanage (1960). (B) De Carlo's scheme at Classe (1961-1964).

FIGURE 3.1: Organization of building forms and spaces based on pre-industrial traditional patterns. The geometric order of the whole is inherent in the form of the individual parts. *Source*: (Zucchi and De Carlo, 1992, p. 114).

This section has pointed out the need to incorporate social values and cultural identity in housing to develop design strategies that are appropriate to the economic and climatic needs of people. The challenge in self-help housing has always been identifying appropriate housing models that responds to the social needs and cultural values of the end-users. This study explores the application of flexible housing as possible solution to the challenges

[7] See (Rudofsky, 1964, p. 41, 106, 119, 125).

of self-help housing needs in Botswana. The following sections discuss theories and concepts of flexible housing as it applies to self-help housing in this research.

3.2.3 Self-help housing

Self-help housing according to Oliver (2010, p. 15), is by the occupants themselves, without external professional intervention. Turner (1977, p. 155) defines self-help housing as a process which places key-decision making responsibilities in the hands of inhabitants. Turner (1977, p. 89–101) contends that self-help housing as a process can adequately meet people's housing needs and gives the dweller control over what is appropriate for them (see Figure 3.2). Proponents of self-help housing argue that it allows dwellers to become active recipients or consumers of housing products resulting in houses that reflect their values and needs (Oliver, 2010, p. 16; Turner, 1977, p. 155).

(A) Concrete blocks (B) Roofing material (C) Window frames

FIGURE 3.2: People in Mochudi practice self-help housing by accumulating building materials for future building purpose. They buy materials as funds become available.

Despite the impact and influence of self-help housing in the 1970s[8], especially in developing countries, self-help housing schemes attracted a lot criticism[9]. The criticism is mainly on internationally biased standards imposed on aided self-help housing projects, which did not take into consideration local cultural practices, economic situations and building regulations (World Bank, 1993). The emphasis on technical solutions and high standards failed in many countries as they were often socially inappropriate and cost prohibitive (Bredenoord and van Lindert, 2010; Harris and Giles, 2003; Pugh, 1997).

According to housing literature, there has been three important phases (or programs) in housing policy development since the 1950s (Stren, 1990, p. 35–53; Pugh, 1997). These

[8]For example, more people who did not have secure land tenure, no access to water and sanitary facilities benefited from the scheme in many developing countries, that is; in Latin America, Africa and Asia (Abbott, 2002; Huchzermeyer, 2006).

[9]For a general discussion on self-help shortcomings, see Burgess (1977, 1985), in which he suggest that the economies and political structure in developing countries is not sufficient to bridge the growing gap between housing needs and housing supply using self-help concepts. Also see (Ward, 1982; Ward and Macoloo, 1992), in which they argue that the poor derived few benefits from these government-inspired organizations.

housing programs are: public housing (1945-1960s), sites and services or 'aided self-help' (1972-1980s), and the market enabling (1980s-present) (Stren, 1990, p. 35–53; Pugh, 1997). However, Harris and Giles (2003, p. 137) disagree with the chronological ordering of housing programs. They argue that housing programs are not mutually exclusive, as different approaches are necessary for different countries (Harris and Giles, 2003, p. 181). Harris and Giles (2003, p. 167–191) further argue that despite the differences in the chronological ordering of housing policies by researchers, the trajectory is similar. This study will not cover housing policies and housing finance in-depth as there is a substantial amount of research from other scholars on housing policies[10] and housing finance[11].

In housing research and practice Turner (1977; 1972) is widely credited with the self-help housing concept and the incremental construction process (Burgess, 1978, p. 1105). Turner (1977; 1972) proposed self-help housing as an affordable approach to housing economies of third world countries (Burgess, 1978, p. 1105). The theory of self-help housing as developed by Turner (1977; 1972) in the 1950s and 1960s and promoted by international organizations in the 1970s, led to the concept of *aided self-help housing*[12] (Drakakis-Smith, 2000; Harris and Giles, 2003; Ward, 1982). The most important aspect of housing policies over the years is that self-help housing and market enabling policies have been considered to be viable approaches to address housing challenges in the developing world (Harris and Giles, 2003; Pugh, 1997; Stren, 1990). Many countries replaced public housing programs in the early 1950s with aided self-help housing for social and economic benefits (Pugh, 1997; Stren, 1990).

According to proponents of aided self-help housing

> "...aided self-help made sense not only on grounds of financial expediency, but also as an element of indigenous economic and cultural development" (Harris and Giles, 2003, p. 170).

These views are also shared by Wekesa et al. (2011, p. 244) as they submit that informal settlements, which exclusively practice self-help housing are responsive to the socio-economic conditions of the urban poor and are a viable solution to housing challenges in third world countries. As housing challenges increase in developing countries, advocates and critics of pro-poor housing policies and literature on housing research, call for a

[10]For general discussions on housing policies see Balchin (1996); Ball (2013); Malpass (2000).

[11]For an account on housing finance see for example Buckley (1996); Favilukis et al. (2010); Warnock and Warnock (2008).

[12]Harris and Giles (2003, p. 170–175) trace the origins of 'aided self-help' to Jacob L. Crane (1927; 1950; 1951). Harris and Giles (2003, p. 170–175) credit Crane (1927; 1950; 1951) with coining the term aided self-help housing in about 1948. Harris and Giles (2003) contend that Crane (1927; 1950; 1951) promoted the practice and theory of aided self-housing while at the Housing and Home Finance Agency in Washington, DC.

re-evaluation and return to the aided or assisted self-help housing model that was popular in the 1970s[13]. Critics argue that emphasis on high building standards displaced many people from the serviced sites as they could not afford to develop their own houses due to lack of finance (World Bank, 1993).

3.2.4 Challenges of self-help housing

A historical review of the numerous housing projects that have failed around the world, shows that the main reason was not the use of industrial material, building technology or modern building forms, but a lack of consideration of people' s cultural values and social needs (Habraken and Valkenburg, 1972; Hamdi et al., 1995; Wendl, 2013). Housing was reduced to a financial and technical problem, with a misplaced hope that a technical approach was going to solve all the housing problems (Habraken and Valkenburg, 1972). One of the most spectacular failures of these Utopian ideals is the Pruitt-Igoe public housing project (See Figure 3.3), in St. Louis, Missouri, USA, which caught the world's attention in a widely televised 'trial demolition' event in April 21, 1972, only 20 years after its construction (Wendl, 2013, p. 106). These failures should serve an important lesson to the consequence of not incorporating cultural values in housing in Botswana.

FIGURE 3.3: An image of the "trial demolition" of one of the 33, 11 storey towers in Pruitt-Igoe; C-15, on a widely televised demolition on April 21, 1972. *Source*: (Wendl, 2013, p. 106)

Some of these housing failures are mainly due to the rapid technological changes and the slow evolutionary process of traditional builders who often lack theoretical understanding of progressive design methods (Lawson, 2006a, p. 21). However, Lawson (2006a, p. 19)

[13]The point is made by Bredenoord and van Lindert (2010), in their call for housing policies that support self-build. Also see Choguill (2007) as he suggest that housing policy should be placed within the framework of sustainability. Also see Budds et al. (2005), a policy framework developed by Sao Paulo municipal government, with emphasis on improving the quantity and quality of housing for low-income groups.

maintains that there is still much to learn from traditional housing processes which are cheaper, easier to build, and offer simpler and more reliable solutions with a few variable components. Over the years, Fathy (1986, 2010) has written extensively on the need to revisit the vernacular architectural principles, where houses were built to meet specific needs, accommodate values, economies and ways of life of the cultures that produce them.

As already stated in this section the challenges of a self-help housing approach is that they are socially inappropriate and cost prohibitive (Bredenoord and van Lindert, 2010; Harris and Giles, 2003; Pugh, 1997). This study investigates the application of flexible housing as a strategy to improve the quality of self-help housing in Botswana.

3.3 Flexible design in housing

This section introduces the concepts on flexible housing strategies with examples of how they have been applied in different contexts around the world. The discussions are organized into two parts. Firstly the general meaning and definition of what constitutes flexible housing is given. Secondly the theories and concepts related to flexible housing research and projects, with a particular focus on those that are socially and economically viable for Botswana's context, are presented.

3.3.1 Meaning and definition

Flexible and adaptable housing are at times, as concepts, used interchangeably, but they mean different things. This thesis adopts the term flexible housing as a way of improving the quality of self-help housing by incorporating the potential to make social (adaptable) and technological (flexible) changes over time (Schneider and Till, 2007, p. 4–5). This is achieved by both flexible and adaptable design strategies that respond to changing social needs and physical arrangements of self-help housing (Schneider and Till, 2007, p. 4–5). Figure 3.4 and 3.5 are examples of incremental housing which are flexible in approach. Groak (2002) through Schneider and Till (2007, p. 5) define flexibility as the capability for different physical arrangements and the adaptability for different social uses. Flexibility encompasses adaptability and many other forms such as modularity and prefabrication (Schneider and Till, 2007). However, adaptability as defined by Schneider and Till (2007, p. 5) refers to spaces that can be used for different activities.

The most appropriate definition of what is flexible housing, is the one given by Till and Schneider (2007, p. 4) that it is:

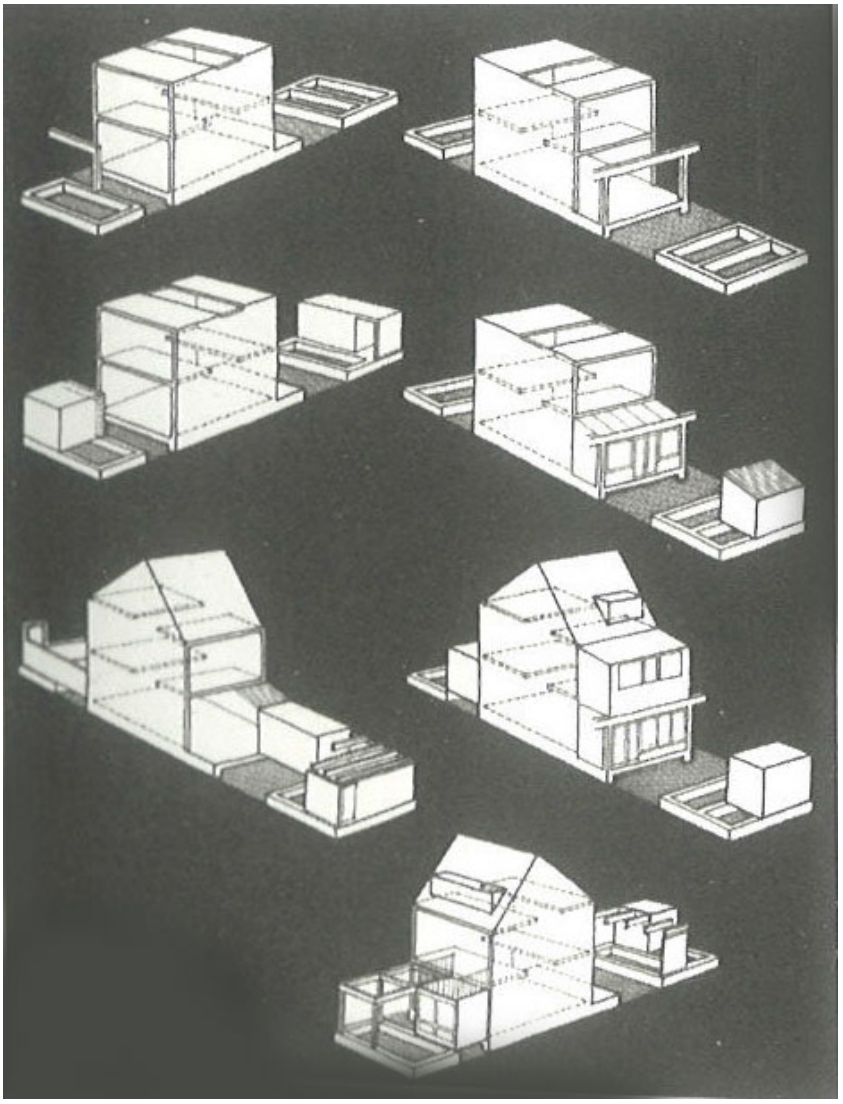


FIGURE 3.4: The basic principles of a carcass house project by the Dutch architect Sjirk Haaksma who was inspired by Habraken and Valkenburg (1972)'s supports systems's theory. The carcass is related to an idea of a living organism changing from one state to another. *Source*: (Leupen et al., 2005, p. 15).

> "... is housing that can adjust to changing needs and patterns, both social and technological. These changing needs may be personal (say an expanding family), practical (i.e the onset of old age) or technological (i.e the updating of old services). The changing patterns might be demographic (say the rise of single person household), economic (i.e the rise of the rental market), or environmental (i.e the need to update housing to respond to climate change)."

Over the years architects and urban planners have developed various forms of housing typologies and a wide range of layouts in an attempt to address people's needs. In addition, there are numerous examples of architecture that apply adaptable design methods, based on systematized and repetitive design elements (Habraken and Valkenburg,

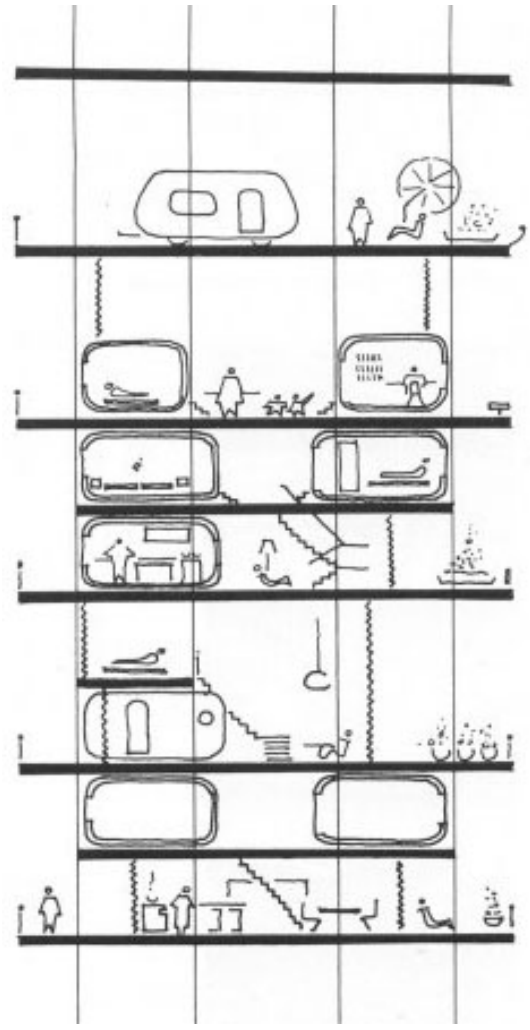
(A) (B)

FIGURE 3.5: The Quinta Monroy social housing project by Elemental in Iquique, Chile. Also known as houses that grows. *Source*: (Aravena and Iacobelli, 2012, p. 138–185).

1972). Some of the well-known examples are the use of repetition, order and proportion in Georgian, Classical or Modernist architecture (Adam and Brentnall, 1990; Curl, 2002). These concepts were based on a grid system and volumetric modules (Adam and Brentnall, 1990; Curl, 2002). For example Walter Segal's work on modularization and standardization of timber-frame housing design in the 1970s (McKean, 1989); the System 4D's using standard frames with flexible interiors. The Smithsons'Appliance House in 1958, a house as a container of objects (Smith and Lewi, 2008). Subsequent research on these themes formulated more fully developed theories and practical tools for housing design processes.[14].

The modular structural systems or support system theories and concepts, which are basically a system of primary and secondary structures, were used successfully by John Habraken (2000; 1972; 2008) (see Figure 3.6) and Herman Hertzberger (2005; 1991) (see Figure 3.7). The modular structural system allowed individuals to create their own spaces within a defined structure, which offered a simplified approach to change both the physical and non physical aspect of housing (Habraken and Teicher, 2000; Habraken and Valkenburg, 1972; Hertzberger, 2005). Charles Correa (2000; 1996) also developed a modular design system based on social and cultural patterns, as well as existing income profiles and existing plot sizes in India (see Figure 3.8). These modular structural systems reflect criticism offered by Alexander (1979, 1985), Neis et al. (1987), Rapoport (1982, 1990), Venturi (1977) and other prominent architecture critics as they rejected

[14]A few examples being Hamdi (2010)'s guide on design approach and place-maker's tools. Also see School of Architecture for Children and Youth (2014), who developed architectural tool-kits of life-size buildings blocks developed for the purpose of research. Also see Avanquest Software (2014); an architectural software that guide users step by step through all the design states of their project. More recently, architects have been attracted to the possibility of using information technology to develop hardware and software; open and shared by everyone. An example is the Wiki-House which create easy to use design and construction documentation sets that are down-loadable (wikiHouse, 2014).

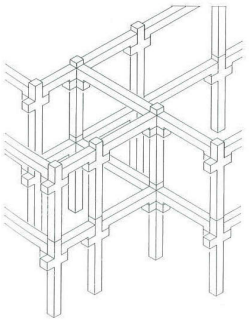


(A) Support structure theory. *Source*: (Habraken and Valkenburg, 1972).

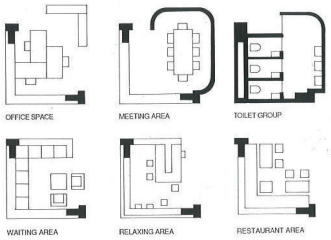
(B) Support structure housing in Amsterdam. *Source*: In Wikipedia.

FIGURE 3.6: Support system theories and concepts developed by Habraken (1985; 1972), as a system of 'primary' and 'secondary' structure in the Netherlands.

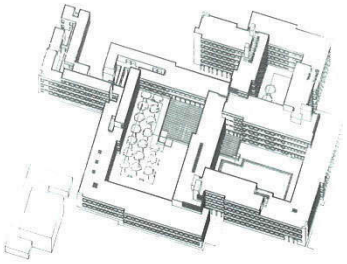
the conventional design processes as reductive and lacking in the complexities of real life. It was also a response to the opposition of systematic design approach on the grounds of aesthetic and artistic freedom (Jones et al., 2013). This approach allows the user to engage with the design system to control the end product (the house) according to their tastes, desires and functional requirements (Habraken and Teicher, 2000; Habraken and Valkenburg, 1972).



(A) A structural system of columns, beams and floor elements.

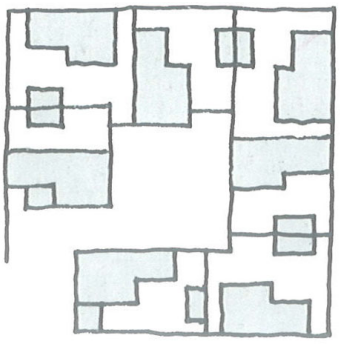


(B) Interpretable zones to perform all foreseeable functions.



(C) Two and three storey modular units organized around courtyards.

FIGURE 3.7: Load-bearing structural framework, independent of the walls, doors and ceilings, etc. In addition, the buildings are built to take more floors on top, as a way of supporting continuous changes and extensions. *Source*: (Hertzberger, 2005, p. 127–133).



(A) A basic unit with a shared courtyard, 8m by 8m, around which are grouped 7 houses.

(B) Three basic units grouped around courtyards to form a cluster of 25 houses.

(C) A cluster of seven houses around an 8 m by 8 m courtyard.

FIGURE 3.8: A modular design approach that is based on the principles of flexible patterns (affordable, replicable, etc), that grow naturally over a period of time. *Source*: (Correa, 2000, p. 48–53).

3.3.2 Flexible design and flexible housing

To suggest that a flexible housing approach will improve the quality of housing presents difficult and interesting challenges. Firstly the term housing quality involves immeasurable factors such as the cultural meaning, values and expectations of people, as noted by Rapoport (1969a, p. 136). Secondly is the ongoing debate on the idea of a logical approach to architecture and design theory[15].

[15]For example, the work of Daley (1969, 1982), in behavioural psychology and architectural design, questions the concept and approach that designers can base their decisions on systematic examination. Another prominent critic, Amos Rapoport (1969a, p. 136–146), entirely rejects the validity of scientific methods, as he argues that they are based only on 'objective' evidence. However, supporters of science-based design research such as Gordon (1969, p. 147–167) and Studer (1969, pg. 55–70), argues that a simplified process with a logical structure reduces a vast and complex amount of information into manageable sizes.

The criticism of the 'Modern Movement' architects and the CIAM's Charter of Athens functional approach to housing, sets the foundation for an extensive design method research period in architecture, engineering, industrial design and urban planning in the 1950's and 1960's[16]. Design theories and concepts that were developed seek to integrate humans and their environment. Despite these theories and concepts it still remains unclear as to what is the most effective and sustainable way to house the poor. This can largely be attributed to the lack of or the limited application of these concepts in self-help housing societies (Habraken and Valkenburg, 1972; Hamdi et al., 1995; Turner and Fichter, 1972).

Research in Design methods or Scientific research methods came into prominence in the 1960s, as a way of solving 'architecture design problems' (Alexander, 1964; Alexander et al., 1977; Broadbent and Ward, 1969; Habraken and Valkenburg, 1972). One important concept to emerge from the studies of design methods is the development of a systematic design process or the analysis-synthesis model (Darke, 1979, pg. 36–44). At the time, it was an important concept which later proved to be insufficient to address the complexities and ambiguities in architectural design (Steadman, 2008, p. 163–178; Hanson, 1969, p. 37–44; Kent, 1990).

The research in design methods was a key moment in design theory and architectural history studies (Alexander et al., 1977; Broadbent and Ward, 1969; Habraken and Valkenburg, 1972). Even though it has long been dismissed as a failure, the recent resurgence of interest in scientific design methods is a consequence of theories developed in the mid- 20th century (Rapoport, 1969a; Steadman, 2008). The difficulty in systematized and logical approaches in design is setting the criteria for evaluating people's cultural values and norms (Rapoport, 1969a, p. 136–146). Shove (2004, p. 19–30) was critical of the lack of expressiveness and symbolism in systematic design processes. Nevertheless, subsequent research attempted to close these gaps with more focus on engaging the user in the design process.[17]

Criticism and objections to systematic and logical approaches to design are widely publicized (for example see reviews given by Daley, 1969, 1982; Hamdi et al., 1995;

[16]More recently attention has been directed towards the development of design methods and theories intended to guide household users in layout design. For example, the concepts studied and developed by Hamdi (2010), with critical insights in user participation in housing and settlement planning (Hamdi, 2010; Hamdi et al., 1995). Nabeel Hamdi's work was inspired by Habraken and Valkenburg (1972) development of support structure's systems and theories. They were also developed as a criticism to mass housing approach which removed the user from the housing process (Habraken and Valkenburg, 1972, p. 12–15).

[17]For an account on user-centered approaches, see the work of Habraken (2000; 1972), on support system theory. Also see reviews given by Hamdi (2010; 1995), in *Housing without houses: participation, flexibility, enablement* and *the Placemaker's guide*.

Rapoport, 1969a). Some noted pioneers[18] of the design methods movement have admitted to the shortcomings of explicit design methods, which were meant to replace intuitive design approaches (Steadman, 2008, p. 163–178). Much of the work in the design process has been criticised for an over-simplification of complex design challenges, resulting in housing without architectural or cultural meaning (Rapoport, 1969a, p. 136–146). As already discussed in Section 3.2 there are many factors to be considered in housing; both physical and social. Even more significantly a lot of these factors are unknown and beyond the designers' control at the initial design stage (Darke, 1979), but still do have a major influence on the quality of housing.

Despite criticism in design research methods and processes, a logical and simplified approach is necessary to synthesize housing requirements, people's needs and cultural values. This is extremely important especially given that housing problems are often ill-defined and mostly unknown at the conceptual stage (Alexander et al., 1977; Habraken and Valkenburg, 1972; Hamdi, 2010). Often, design problems become clearer during the process of design, construction and occupation as more information and resources become available (Alexander, 1964; Braha and Maimon, 1997).

Another important concept to emerge from the systematic and logical approach research is that of open building (Kendall and Teicher, 2010). The principles of open building are derived from:

> "... industrial production, emerging technologies, improved logistics, and changing social values and market structures" (Kendall and Teicher, 2010, p. x)

An open building approach is based on the capacity to change over time to changing uses and lifestyles, with minimum effort (Kendall and Teicher, 2010, p. 1). It incorporates a system of construction rules to improve efficiency. However, various building elements could be positioned in a way that creates variety (Kendall and Teicher, 2010).

According to (Kendall and Teicher, 2010, p. 1–5), the values of open building design approach are:

- incremental development by minimizing initial costs and maximizing potential growth,
- building that reflects social and cultural values, rooted to a specific place/context,
- affordability - reducing life-cycle costs,
- use of local materials and construction methods, and

[18] Christopher Alexander has since rejected some of his earlier works altogether. Also Hanson (1969, p. 37–44) has admitted to the complicated process of using systematic design methods which also proved disappointing when applied in practice.

- user-participation and empowerment in design and construction process.

These open building values such as incremental housing, participatory building and the use of local materials are similar to traditional Tswana architecture presented in Chapter 2.

3.4 Conclusions

Traditional design processes worked well in the past as changes were relatively stable and the process of design was very closely associated with construction (Lawson, 2006a, p. 23). Also, in these traditional societies, dwellings were very important expressions of cultural values and social practices, a sacred process, not an economic exercise or a political ideology (Habraken and Valkenburg, 1972). The design and building process of housing followed certain social practices and design themes which were developed over many generations (Habraken and Valkenburg, 1972; Oliver, 2010). Unfortunately, the complexities and scale of housing challenges of the contemporary societies, characterized with rapid population growth, rapid urbanization, along with rising construction and energy costs cannot be met with traditional design methods (Fathy, 1986; Hamdi, 2010). Fathy (1986, p. 1–9) contends that this does not mean that traditional methods that have sustained communities for centuries have to be abandoned all together. The knowledge and experience in traditional and vernacular architecture is invaluable, but it can be greatly improved with systematic design methods as argued over the years by prominent architects such as Fathy (1986, p. 1–9), Alexander (1964, p. 4–6), Correa (2000; 1996), Habraken (2000; 1972; 2008), and Hertzberger (2005; 1991).

Architecture critics understandably oppose the idea of a logical or systematic design approach on the grounds of aesthetics and artistic freedom (For further discussions on these see for example Shove (2004, p. 19–30), Kent (1990, p. 1–2), Rapoport (1969a, p. 136–146)). It is important to note that what is being developed here is not a house design but a process - a setting that incorporates incremental growth in self-help housing (Aravena and Iacobelli, 2012). It is an attempt to simplify the design process with tools that are more predictable, controllable and flexible to improve the current design approach (Aravena and Iacobelli, 2012; Habraken and Valkenburg, 1972).

This chapter has presented how housing in Botswana can benefit from self-help concepts and design strategies developed in other countries. These concepts and theories emphasize the importance of integrating culture, technology and flexible (systematic) housing design in architecture. The studies highlighted the challenges between those that strongly

believe that architecture should be left to the creative ability of a designer[19] and those that argue that the problems are too complex for a designer to comprehend[20] without 'formal' assistance. There is no reason why the two cannot be reconciled in a design process. Some of the criticism towards the 'flexible' housing approach proposed in this study is that it is unable to deal with the subjectivity of architecture and the difficulty of incorporating people's cultural values and social practices. However the examples of projects that have applied the principles of flexible design strategies proved that this approach provides capacity for future changes with minimal effort without compromising the quality of housing (Kendall and Teicher, 2010). These concepts and theories provide a basis to propose an appropriate housing strategy for Botswana.

[19]For example see Hamdi et al. (1995); Rapoport (1969a); Shove (2004).
[20]See the work of Alexander (1964); Habraken and Valkenburg (1972).

Chapter 4

Research methodology

4.1 Introduction

To understand and explain the research methods and research design that addresses the research questions, a research methodology is required to set a system of rules and procedures for logical analysis (Creswell, 2013; Sexton, 2003). Research methodologies are also used to guide how one reports the findings and evaluations of the research for others to understand and replicate the process (Ghauri and Grønhaug, 2005; Taha, 2005). Chapter 3 presented the theoretical and conceptual framework of housing and architectural design as it relates to the current research. Section 4.4.2 reviews the applicable theories of a participatory action research (PAR) and how that informs the research methodology in this study.

This chapter discusses qualitative case study, participatory action research (PAR) methodologies, data collection and data analysis methods applied in this research. The first section; Section 4.2 is an introduction and a general overview of the conceptual and philosophical framework. The following sections; Section 4.3 and 4.4, review the two qualitative research methods: first is the case study research, which forms the basis for the second method - PAR through a focus group. The final sections discusses and reviews the data collection methods (Section 4.5), data analysis techniques (Section 4.6) and data validation methods appropriate for this research (Section 4.8).

4.2 Research philosophy

This section introduces an overview of philosophical assumptions, beliefs and interpretive frameworks that inform the theories and concepts of this research (Creswell, 2013).

Table 4.1 gives a summary of the link between the philosophical assumptions and the interpretive frameworks discussed in this section.

	Interpretive frameworks	
Philosophical Assumptions	Social Constructivism	Transformative / Postmodern
Ontological Beliefs (the nature of reality)	Multiple realities are constructed through our lived experiences and interactions with others.	Participation between researcher and communities/individuals being studied. Often a subjective-objective reality emerges. A focus group was an important platform for residents to participate in a design workshop.
Epistemological Beliefs (how reality is known)	Reality is co-constructed between the researcher and the researched and shaped by individual experiences. Interview and focus group strategies developed a relationship with the researcher and the researched.	Co-created findings with multiple ways of knowing. Scenario workshops were used to develop appropriate design solution with the participants.
Axiological Beliefs (role of values)	Individual values are honoured, and are negotiated among individuals. People's values, attitudes and aspirations are taken into account in developing an appropriate design solution for housing.	Respect for indigenous values; participants were part of developing a design solution for self-help housing for themselves.
Methodical Beliefs (approach to inquiry)	More of a literary style of writing used. Use of an inductive method of emergent ideas (through consensus) obtained through methods such as interviewing, observing, and analysis of texts.	Use of collaborative process of research; a participatory action research is applied in this study.

TABLE 4.1: Interpretive frameworks linked to the philosophical assumptions (Edited from (Creswell, 2013, p. 36)).

4.2.1 Philosophical assumptions and beliefs

Philosophies as defined by Creswell (2013, p. 15–22), are abstract ideas and beliefs that researchers bring to research. These philosophical assumptions inform the research problems and research questions, data collection and data analysis of research (Creswell, 2013, p. 15). Yin (2014, p. 38) advises that theoretical propositions are important and should be developed prior to data collection. They also help in identifying patterns to be studied and interpretation of data (Boyatzis, 1998). Eriksson and Kovalainen (2008, p. 11) notes that in order to develop good research methods and designs, researchers should be:

"...familiar with the basic philosophical concepts, positions and traditions".

However, many architecture researchers never make explicit their philosophical positions and assumptions (Eriksson and Kovalainen, 2008, p. 11). Eriksson and Kovalainen (2008, p. 11) also acknowledge that it is possible to do research without any theoretical position. Howe (1988) on the other hand contends that the methodology applied to investigate the research problem is much more important than the debate on a philosophical position. This research does not require a detailed philosophical or theoretical propositions as in the social sciences, but as noted by Eriksson and Kovalainen (2008, p. 11), some basic and key philosophical concepts are considered for the following reasons:

- why researchers are interested in different topics and research questions;
- why qualitative research can be performed in many ways;
- why qualitative data can be collected and analysed in many differing ways;
- why different methods are being used in analysing the data.

The theoretical assumptions of this research is that the quality of self-help housing can be improved through flexible housing strategies and participatory design approach. As already noted, it is important that the philosophical assumptions are made explicit by the researcher (Creswell, 2013, p. 18–22). The philosophical assumptions applied in this research are namely; epistemology, ontology, axiology and methodologies (Creswell, 2013; Guba et al., 1994). The following explains how these philosophical assumptions are applied in this study (also see Table 4.1):

- **Ontological:** The ontological position of this research is that reality is subjective, socially constructed and multiple perspectives are offered by the individuals (Creswell, 2013; Guba et al., 1994). The ontological assumptions about reality being socially constructed and subject to change lands this research to be based on the social constructivist paradigm (Guba et al., 1994; Sale et al., 2002). The multiple

perspective is reflected by data collected from multiple sources of evidence which are presented in Section 4.5 (Creswell, 2013, p. 20).

- **Epistemology:** Housing, design and cultural studies are broad and highly subjective research areas as already presented in the literature review. Therefore, it is important that researchers collect the subjective data by experiencing and conducting the research in a 'real' context (Creswell, 2013, p. 20). This allows researchers to understand and experience the life of the participants (Creswell, 2013, p. 20) through direct observations (Yin, 2014). The case study research and focus group applied in this research allowed the researcher to get first hand information from the participants (Creswell, 2013, p. 20).

- **Axiology:** It is important that researchers make their values, assumptions and personal interests known to the readers (Creswell, 2013; Yin, 2014). This is because what they bring into a research study will inform what problems to study, how to ask research questions, what and how to collect and analyse data, and interpretation of the data (Creswell, 2013; Yin, 2014). The author's background in architecture and personal interest in the flexible and participatory design approach is reflected in this study. For example, the author previously worked on an M.Arch thesis that proposed flexibility and participatory action for the design of an indigenous community in Botswana. Therefore, the author's personal interest and experience with these two methods influence the belief that it is an appropriate design approach for self-help housing in Botswana. However, it is worth noting that flexible design approach (Alexander, 1964; Habraken and Valkenburg, 1972) and participatory housing processes (Hamdi, 2010; Harris and Giles, 2003; Turner, 1977) are widely used in housing in many developing countries; and proposing it as an appropriate design approach is not only dependant on personal experience or interest. It is common for qualitative researchers, especially architects, to be biased towards a particular approach in their work, but still conduct a separate study with different research problems, research questions and different research methods (Yin, 2014; Hamdi et al., 1995; Creswell, 2013, p. 11).

  In as much the professional values and personal interests influence the research, the readers's own values and interests also influences how they interpret the report (Creswell, 2013; Yin, 2014). In addition, translating cultural meanings and expressions is one of the major challenges in case study research (Stake, 2013; Yin, 2014). In some cases researchers might wrongly interpret the cultural meaning or make biased assumptions (Stake, 2013; Yin, 2014). Another important consideration is the responses given by research participants because they are largely influenced by their own values, assumptions or suspicions of the researchers's intentions (Stake,

2013; Yin, 2014). As a result, they give answers that may not be a true reflection of their values, rather what they think is correct (Stake, 2013; Yin, 2014).

The conclusion from these discussions is that this is a value-laden research (Creswell, 2013; Denzin and Lincoln, 1994); with assumptions, beliefs and the relationships between the researcher and the researched influencing the outcome of the research (Denzin and Lincoln, 1994; Guba et al., 1994; Yin, 2014).

- **Methodology:** These are the procedures and logic used in qualitative research and they are briefly discussed below:

  (i) *Deductive logic:* Eriksson and Kovalainen (2008) defines this model of research as developed from theory, through research hypothesis to empirical analysis. This approach follows a linear process of developing hypothesis from theoretical knowledge (Eriksson and Kovalainen, 2008; Hyde, 2000). The hypothesis in this study is not purely built on theoretical knowledge of self-help housing and flexible design approach. The hypothesis is also based on empirical knowledge of housing in Botswana and the author's professional background in architecture. Therefore, this research is not strictly developed from theory as a form of knowledge which means it does not follow deductive logic.

  (ii) *Inductive logic:* This model of research derives knowledge from empirical research and observed cases to develop theory (Eriksson and Kovalainen, 2008; Hyde, 2000). According to Eriksson and Kovalainen (2008), this approach is not common or even possible for developing theoretical propositions from empirical studies. The hypothesis developed for this research is not meant to test any existing theoretical knowledge nor to support or dispute existing self-help housing and flexible housing models.

  (iii) *Inductive-deductive logic:* It is common to use both deductive and inductive logic in the same research (Eriksson and Kovalainen, 2008). This method is also known as a 'Hybrid Approach' as defined by Boyatzis (1998, p. 51–53). This approach, as defined by Eriksson & Kovalainen (2008) refers to evaluating new ideas or hypotheses through empirical data. In this study, a 'new' flexible housing approach is proposed based on the empirical studies conducted in Mochudi.

4.2.2 Interpretive frameworks

There are several interpretive frameworks commonly used with philosophical assumptions such as: social constructivist (at times called interpretivism), positivism, the post-positivist,

critical theory and transformative perspective (post-modern perspective) (Creswell, 2013; Guba et al., 1994). The philosophical assumptions (ontological, epistemological, axiological, methodological) stated in Section 4.2.1, can be used with different interpretive frameworks (Creswell, 2013, p. 22–38).

This research draws on the social justice theories or advocacy/participatory theories (Creswell, 2013, p. 23) by seeking to improve the quality of housing in Botswana through a flexible and a participatory design approach. According to Creswell (2013, p. 34), this is one of the most important applications of the social justice framework which is an inclusive approach that has the potential to reform housing strategy and policies in Botswana. As a result it improves the quality of lives for the marginalized people or the poorly housed.

The first part of this research which is qualitative case study research, applies the commonly used interpretive framework in qualitative research; *social constructivism* (Creswell, 2013, p. 24–25). This is because the study is focused on understanding people's views and values in self-help housing. Studying cultural meanings and social values is subjective and the interpretations are influenced by the experience and personal interest of the researcher, the researched, and the reader (Denzin and Lincoln, 1994; Guba et al., 1994; Yin, 2014).

The second part which is PAR conducted through a focus group; applies another commonly used interpretive frameworks that aim to improve the quality of lives of marginalized groups: *a transformative framework* (sometimes referred to as post-modern) (Creswell, 2013, p. 25–27). Marginalized groups in this research are people who cannot afford to build a decent house for themselves. This study seeks to introduce a flexible housing strategy that can be used to improve the quality of their housing. The design strategy is developed through PAR in focus group research workshops conducted in Mochudi. In this way, participants become 'active collaborators' developing design strategies that will benefit them (Creswell, 2013, p. 26).

4.2.3 Linking research philosophy and interpretive frameworks

Section 4.2.2 and Table 4.1 provided an overview of the two interpretive frameworks used in this study; that is the social constructivism and the transformative framework (Creswell, 2013). This section links the philosophical assumptions discussed in Section 4.2.1 to these interpretive frameworks provided in Section 4.2.2. According to Creswell (2013, p. 35), both the philosophical assumptions and the interpretive frameworks

"... informs the problem to study, the research questions, the data collection and analysis, and the interpretation ".

Creswell (2013) further emphasizes the importance of research design in developing philosophical assumptions, interpretive frameworks, and on the procedures involved in studying social or human problems pointing out that:

"Qualitative research begins with assumptions and the use of interpretive/theoretical frameworks that inform the study of the research problems ... The final written report or representation includes the voices of participants, the reflexivity of the researcher..." (Creswell, 2013, p. 44).

Table 4.1 presented a summary of the link between the philosophical assumptions and the interpretive frameworks.

4.3 Research methods and techniques

Table 4.2 presents the research methods and data collected for this study, within the respective theoretical constructs, research aims, and objectives.

Research methods are techniques that a researcher uses to enquire into a phenomena (Yin, 2009, p. 79). Research methods are highly contested based on quantitative-qualitative paradigms because of ontological and epistemological differences (Guba, 1987; Howe, 1988; Sale et al., 2002). There is no agreement as to what constitutes a relevant philosophical position or practical solution to compliment both these research paradigms (Howe, 1988; Sale et al., 2002). In an attempt to provide a solution Sale et al. (2002) proposes a mixed-method approach that can be carried out in a single study or in a number of investigations. Howe (1988) argues that research should be based on 'what works' rather debate on epistemological paradigms. Following on the argument by Howe (1988) and the wise advise by Creswell (2013, p. 300), this research applies qualitative research as a methodological approach to inquiry that explores social or human problems.

Creswell (2013, p. 300) defines qualitative research as a methodological approach to inquiry that explores social or human problems. The aim of this research involves cultural studies; itself a complex and immeasurable phenomena (Rapoport, 1969b, 1998). Sale et al. (2002) states that qualitative methods are based on 'processes' and 'meanings'. Richardson et al. (2000, p. 3) defines qualitative research as:

"... a situated activity that locates the observer in the world ... This means that qualitative research study things in their natural settings, attempting to

TABLE 4.2: Research methods and data collected for this study, within the respective theoretical constructs, research aims, and objectives.

Research aims / objectives	**Research methods / Data collection**	**Theoretical constructs**
1. Understanding the beliefs and motivation of design processes associated with self-help housing communities in Botswana: Chapter 2.	**Case study research** Structured and semi-structured interviews: Section 4.5.2 and 4.5.4. Drawings and photographs.	*Theoretical constructs I*: Section 1.4.1 and 4.7.
2. Encourage housing that is rooted in Botswana's socio-cultural values and climatic conditions: Chapter 2 and 3.	Discussed in Section 4.5.5. Survey maps and physical survey: Section 4.5.5 Documents: Section 4.5.5	
3. Identifying architectural forms and design spaces that people use to express their social values and cultural identity in self-help housing: Chapter 2 and 3.	**Case study research** Drawings and photographs: Section 4.5.5. Survey maps and physical survey: Section 4.5.5.	
4. Encourage self-help housing as a cost effective housing model for developing countries such as Botswana: Chapter 3.	**Participatory action research** Open-ended discussions - Focus group: Section 4.5.3. Scenario workshops:	*Theoretical constructs II and III*: Section 4.7.
5. Allow user-participation and empowerment in housing processes: Chapter 3 and 6.	**Participatory action research** Open-ended discussions - Focus group: Section 4.5.3. Scenario workshops: Section 4.4.2.4.	*Theoretical constructs II*: Section 4.7.
6. Explore a flexible housing strategy that minimizes initial building costs but maximizes future growth by offering possibilities to change and adapt to future use (Payne, 2006, p. 167): Chapter 6.	**Participatory action research** Scenario workshops: Section 4.4.2.4.	*Theoretical constructs III*: Section 4.7.

make sense of, or interpret, phenomena in terms of meanings people bring to them".

The following are important characteristics of qualitative research identified by Creswell (2013, p. 45–47) and also applied in this study:

- **Natural setting:** Qualitative researchers often collect data in the field at the

site where participants experience the issue or problem under study. Mochudi was chosen as the ideal place to study cultural influences in self-help housing. The main reason is that the majority of people in Mochudi practice self-help housing. The other reason is the strong cultural values and traditional practices in Mochudi.

- **Researcher as key instrument:** The qualitative researcher collects data through documents, observing behaviour, and interviewing participants. Sections 4.5 and 4.4 discusses research design and data collection methods in more detail.

- **Multiple methods:** Qualitative researchers typically gather multiple forms of data such as interviews, observations, and documents rather than rely on a single data source. The qualitative research methods and data collection techniques are presented in Section 4.3 and 4.5 respectively.

- **Complex reasoning through inductive and deductive logic:** Qualitative researchers build their patterns, categories, and themes from the "bottom up," by organizing data inductively into increasingly more abstract units of information. The logic for developing themes and categories is given in Section 4.2.1, and the concepts and themes is presented in Section 4.6.

- **Participants' meaning:** For the entire qualitative research process, the researcher focused on learning the meaning that the participants hold about the problem or issue, not the meaning that the researcher brings to the research or from literature. The participants' expressions further suggest multiple perspectives on a topic and diverse views. Interviews with people in Mochudi were carried out to understand people's cultural values and personal preferences in housing.

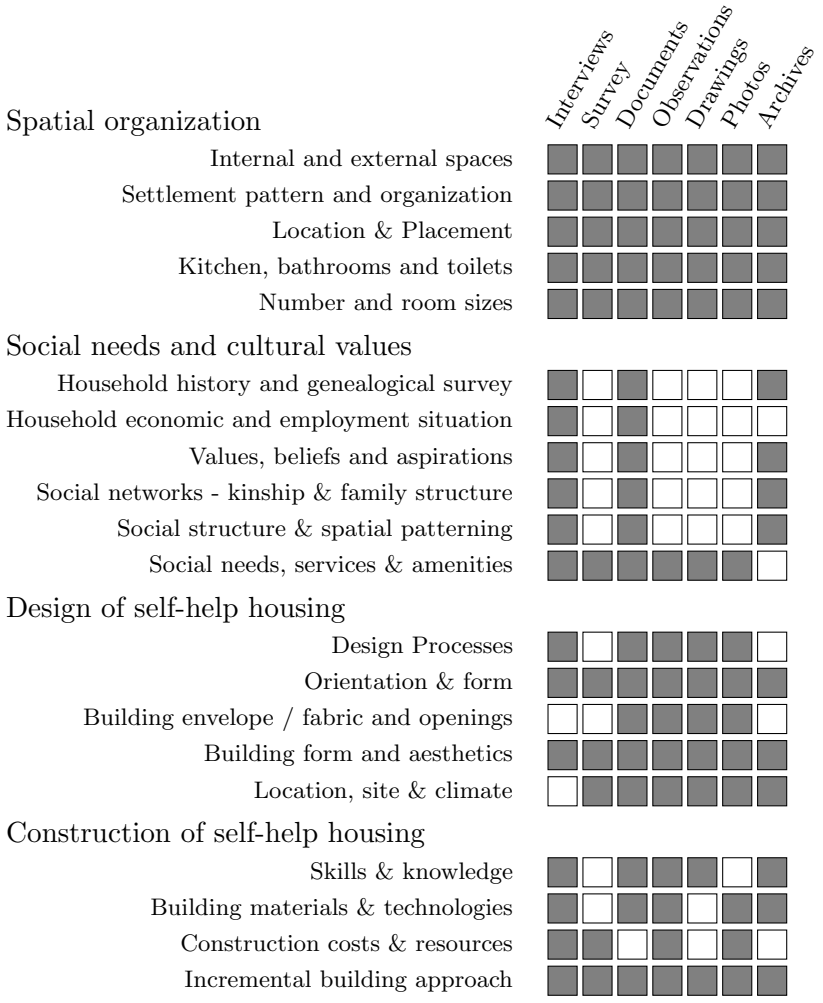
- **Emergent design:** The research process for qualitative researchers is emergent. The key idea behind qualitative research is to learn about the problem or issue from participants and engage in the best practices to obtain that information. As already stated in the introductory chapter, the motivation for doing this research was to study vaulted and dome structures in order to address housing challenges in Botswana. However, it turned out that technical issues are only a minor challenge for housing in Botswana (see Section 1.1 in Chapter 1).

- **Reflexivity:** Researchers "position themselves" in a qualitative research study. This means that researchers convey their background, how it informs their interpretation of information in a study, and what they have to gain from the study. As an architect the author's bias is on the design aspect of housing even though it is not the only major housing challenge in Botswana. Section 4.2.1 states the philosophical values in this study.

- **Holistic account:** Qualitative researchers try to develop a complex picture of the problem or issue under study. The themes and concepts discussed in Section 4.6 and 4.7 covers a wide range of housing challenges in an integrated approach.

Housing is such a broad research subject with complex and numerous research questions that need to be addressed (Oliver, 2010; Rapoport, 1969b, 1982). It is therefore necessary that appropriate research methods and research designs are used (Habraken and Valkenburg, 1972; Hamdi, 2010). This will lead to appropriate design solutions that can improve the quality of self-help housing. Recently, there has been an increase in mixed method research which shares the same research questions (Stake, 2013; Yin, 2014). Multi-methodical approaches are appropriate for housing design methods and cultural studies as they allow for a more detailed and extensive analysis (Asquith, 2005; Lawrence, 2000; Yin, 2014). Data collection and analysis in a mixed method approach usually follows a different but complimentary process that enriches the research (Yin, 2014, p. 65–67). Table 4.3 illustrates a data collection matrix of the information collected and the respective source(s).

TABLE 4.3: A data collection Matrix: Type of Information and Source. Adapted from Creswell (2013, p. 404).



The first part of this study is descriptive case study research that was conducted in Mochudi to understand people's cultural values and social needs in self-help housing. This was carried out using semi-structured, in-depth interviews and direct observations. This is followed by an exploratory study using PAR carried out in a focus group setting using semi-structured interviews and participant observation methods. The aim of the focus group was to introduce and understand participants' conception of design using flexible housing approach. The other reason was to test and validate the hypothesis that a flexible design approach is an appropriate strategy for self-help housing in Botswana.

Survey questionnaires were sent to academics and practitioners to get their views on housing challenges and what could be an appropriate solution to improve the quality of housing for Botswana's economic and climatic context.

4.4 Research design

Yin (2014, p. 26–28) defines research design as:

> "... the logical sequence that links empirical data to be collected to the research questions, and ultimately to the conclusions".

This is a process of research, from conceptualization to solutions, not only data collection, analysis, interpretation and reporting (Creswell, 2013, p. 300). Yin (2014, p. 29) advises that a good research design should have the following:

- a case study's questions (discussed in Section 1.2 and 4.4.1);
- its propositions, if any (discussed in Section 4.2);
- its unit(s) of analysis (discussed in Section 4.4.1.1);
- the logic linking the data to the propositions (discussed in Section 4.4.1.3); and
- the criteria for interpreting the findings (discussed in Section 4.6).

The research design for case study research and participatory (PAR) is discussed in Section 4.4.1 and 4.4.2 respectively. The following sections discuss the items that constitute a good research design.

4.4.1 Case study research

Qualitative case study research is a separate method that has its own research design but it is not common practice (Yin, 2014, p. 49–69). However, Yin (2014, p. 49–69)

advises that it is best to develop a formal case study research design in order to conduct good qualitative research.

The main reasons for choosing a case study research methodology is that the research involves the how and why questions (Yin, 2014, p. 2). The following are reasons why a researcher chooses a case study research as stated by Yin (2014):

- Main research questions are the how and why. As already stated in Chapter 1, Section 1.2, the main research question is how can the quality of self-help housing be improved through design.
- A research has little or no control over behavioural events. The values, beliefs and perceptions of people towards housing changes with time, and
- The focus is a contemporary (as opposed to a historical) phenomenon. The ultimate goal of this study is to introduce flexible housing strategies to improve the quality of design and construction for current and future self-help housing in Botswana.

Another important aspect of case study research design is to ensure that there is sufficient access to study cases, including documents and archival records (Yin, 2014, p. 28). This was an important important criteria for choosing Mochudi as a case study area because of the researcher's previous experience of working in Mochudi. The other reasons is that more studies have been conducted in Mochudi than in other villages in Botswana.

There are three important steps developed by Yin (2012) in designing a case study framework. The first one is in 'Defining a Case'; the second one is selecting one of the 'Four Types of Case Study Designs'; and the third one is the 'Use of Theory in Design Work' (Yin, 2012, p. 6–10). The following Sections 4.4.1.1 to 4.4.1.3 presents case design frameworks and how they are applied in this study.

4.4.1.1 Defining a case

Qualitative understanding of cases requires experiencing the activity of the case as it occurs in its contexts of its particular situation (Stake, 2013, p. 2–3). Stake (2013, p. 1) advises that cases for a multiple case research study need to be similar in some ways. Stake (2013, p. 3–4) further states that one has to know personally the activities and experience the case study; either observed directly or indirectly by others.

There are many factors that lead to the choice of a case to be studied such as an *extreme case*, a *unique case*, a *revelatory case*, or a *common case* (Yin, 2012, p. 7; Flyvbjerg, 2006, p. 230). Some cases are chosen because they contain information that is relevant

to a study (Flyvbjerg, 2006, p. 229–233). Mochudi is a *common case* or an everyday subject to study self-help housing phenomenon in Botswana's urban villages.

Choosing to focus this study in self-help housing and design processes in Mochudi bound the cases to focus data collection and analysis processes. Identifying self-help housing and design as key areas of study was important in choosing the cases, literature review, research participants and the research themes - or case themes for data collection (Miles and Huberman, 1994; Yin, 2012). Constraining data collection into identified *case themes* prevented irrelevant and unnecessary data, making it manageable to analyse (Miles and Huberman, 1994; Yin, 2012). However, Yin (2012, p. 41) advises that 'rival cases' found outside identified themes, can still be collected and analysed.

4.4.1.2 Types of case study designs

Yin (2014, p. 50) proposes a 2 x 2 matrix to describe four types of case study research designs. The four types are:

- Type I: Single-case (holistic) designs,
- Type II: Single-case (embedded) designs,
- Type III: Multiple-case (holistic) designs, and
- Type IV: Multiple-case (embedded) designs.

This study adopts Type III design which is a holistic multiple-case case study research (Yin, 2014, p. 50). According to the definition of multiple-case study, Mochudi provides the context for the case study (holistic) and each individual household (multiple-case) becomes the unit of data collection and analysis (Miles and Huberman, 1994; Yin, 2014). The houses were purposively selected from each household (Yin, 2014). Multiple-case study research does require more resources than single-case study research but the findings are more convincing (Yin, 2014, p. 56–57; Rowley, 2002). Another advantage is that multiple-case study research follows a replication logic (Miles and Huberman, 1994; Yin, 2012); which means the study can be applied to similar households in Mochudi or in other contexts around the world.

4.4.1.3 Use of theory in design work

It is common practice in architecture that designers follow their intuition to develop ideas rather than follow theoretical propositions (Habraken and Teicher, 2000; Steadman, 2008). However, for a case study research, it is advisable to develop a research design

and apply theoretical propositions (Yin, 2012, p. 27). The use of theoretical proposition guides case study research in:

> "...defining the case to be studied; identifying the criteria for selecting and screening the potential candidates for the cases; and suggesting the relevant topics of interest, and therefore, possible data to be collected "(Yin, 2012, p. 27) .

Yin (2014, p. 40–44) argues that theoretical propositions are not only useful for case study research design, but also for 'analytic generalization' from empirical studies. He further advises that rather than think of 'the sample of cases' or the 'small sample size of cases', as a survey study, case study research should always aim for 'analytic generalization' (Yin, 2014, p. 40–44). In this study, the findings from Mochudi can be generalized or 'corroborated, modified or developed in new concepts' to a variety of communities that practice self-help housing in a variety of settings, without relying on the number or size of the sample (Yin, 2014, p. 43). This is possible because interpretation of case study findings are generalized at a conceptual level (Miles and Huberman, 1994; Yin, 2012), not statistical generalization from a sample to a larger population (Yin, 2014, p. 40–44).

Qualitative research provides an opportunity to illustrate a theoretical concept or principle (Yin, 2014, p. 40). They go beyond the hypothetical population of 'a case', and allow for an analytical generalization of case study from theoretical propositions (Yin, 2014, p. 40–43). PAR, flexible housing process and self-help housing are common theoretical models in research and practice around the world (Habraken and Valkenburg, 1972; Hamdi, 2010; Turner, 1977). Therefore, lessons and principles from other countries can be *generalized* to study self-help housing in Mochudi using *analytic generalization* process (Miles and Huberman, 1994; Yin, 2014).

4.4.2 Participatory action research

This section discusses the theoretical aspects of participatory action research (PAR) and how PAR was applied in this study. It is important to note that even though the use of PAR was the ambition of this study, it was not possible to carry out the whole process of PAR due to time and resource constraints. The participants were engaged only in the initial stages of PAR. The definition of PAR given by Whyte (1991b), is that research participants are engaged in the process from the initial design to the final presentation of results and discussions. This thesis only applied the initial stages of PAR methods during the two-day focus group workshops with the local residents and local builders as participants in Mochudi.

This section begins by presenting the meaning and the applicable concept of the participatory design approach in architecture. The methods and tools developed for PAR in this study are also presented. The section concludes by stating the benefits of using PAR methodologies in developing appropriate design strategies for self-help housing in this research.

4.4.2.1 Meaning and definition

Participation theories and practices are well advocated and applied in many different countries with varying degrees of success (Alexander, 1985; Chambers, 1994; Hamdi, 2010). Participatory action research (PAR) are methods that enable researchers to engage with end-users to collaboratively develop a solution for their needs (Maquil, 2015; Whyte, 1991b). Whyte (1991b) defines PAR as:

> "... some of the people in the organization or community under study participate actively with the professional researcher throughout the research process from the initial design to the final presentation of results and discussion of their action implications"(Whyte, 1991b, p. 3).

Following on this definition given by Whyte (1991b), the stakeholders or end-users in this study are the residents and local builders in Mochudi. As already stated the aim of the study is to identify appropriate design strategies in collaboration with the stakeholders. The research also aims to introduce flexible housing strategies as a way of building awareness of other methods that can improve the quality of self-help housing in Botswana. In order to achieve these aims PAR offers a platform for participation, empowerment and collective responsibility towards developing and creating new knowledge (Kravale-Pauliņa and Oļehnoviča, 2015, p. 95–103). This is similar to traditional Tswana practices where members of a community help each other in the construction and maintenance of houses (Larsson, 1996). In the past, the social relationship and collaborative effort between local builders and house owners was key not only in building affordable housing but also in building strong social relationships in the community (Larsson, 1996).

Using PAR, participants can actively make decisions at all or at some stages of research from the conceptual design through data collection and data analysis to final conclusions and reporting of the outcomes (Kravale-Pauliņa and Oļehnoviča, 2015; Whyte, 1991a). There are various ways of applying action-oriented research but this study adopts the three methods identified by Whyte (1991a, p. 2) as follows:

1. social research methodology,

2. participation in decision making by low-ranking people in organizations and communities, and

3. socio-technical systems thinking regarding organizational behaviour.

The first method involves following social research with action that improves an existing situation (Whyte, 1991a, p. 2–3). The intended outcome of this study is to introduce a flexible housing strategy (action) developed from empirical study of self-help housing in Botswana (social research). The hypothesis is that adopting this strategy by the end-users will improve the quality of self-help housing. The second method is about engaging the end-users in developing solutions that meet their social needs and cultural values (Whyte, 1991a, p. 4–5). The flexible housing design for this study is explored in collaboration with residents and local builders as the stakeholders of this research. The third method is about engaging the social and technological knowledge in research projects (Whyte, 1991a, p. 6). The challenge in integrating social research with technological knowledge as noted by Rapoport (2006) is:

> "... the transition from informal, unwritten rules to more formal, written, legalistic rules "(Rapoport, 2006, p. 193).

Section 3.2.2 in the previous chapter presented the challenges of reconciling the gap between technical knowledge and social research in housing which this study seeks to address. The following section presents the participatory design tools and methods that are used to effectively engage stakeholders in developing solutions that improve the quality of their housing.

4.4.2.2 Participatory design tools and methods

There are many design tools, methods and techniques that are used to engage the users in collective design processes. In his pioneering work, Hamdi (2010; 1995) criticised the traditional design approach that treated users as passive objects or consumers of designer's products. His argument also shared by Turner (1972) and Habraken (1972), is that users already have the knowledge and experience in housing themselves (Hamdi, 2010; Hamdi et al., 1995). His advice is that designers and researchers should support users with design tools and use their design skills to facilitate the design process (Hamdi, 2010; Hamdi et al., 1995). Similar advice is offered by Illich (1973, p. 10) that:

> "The crisis can be solved only if we learn to invert the present deep structure of tools; if we give people tools that guarantee their right to work with high, independent efficiency ... People need new tools to work with rather than tools that 'work' for them".

Illich (1973)'s concept can be achieved by allowing end-users to become the 'experts' in the design of their houses. This concept is known as 'convivial tools' as defined by Illich (1973). In this definition, tools do not only refer to the physical but also to the social systems which Hamdi (2010; 1995) advocates for as well (Illich, 1973). Sanders and Stappers (2012, p. 8) refer to convivial tools as generative design processes that:

> "... must be made with people, not only for the people ...".

In this approach people are given tools and a platform to have meaningful input in shaping their environment (Sanders and Stappers, 2012). The proposed flexible housing strategy introduced using PAR in this study basically follows the same concept as convivial tools or a generative design process as defined by both Sanders and Stappers (2012) and Illich (1973). This concept as defined by Sanders and Stappers (2012, p. 13) is:

> "... using creativity to find new ways to help everyday people share their ideas and experiences, and then using design thinking to translate those stories into frameworks that inspire new design directions".

This is achieved by working with the end-users in Mochudi to design their dwellings or facilitating the design process as 'experts'. According to Sanders and Stappers (2012, p. 17) this means changing from the traditional design approach of making 'stuff' to new ways of creating homes using emerging design principles as illustrated in Figure 4.1. Traditional methods can still be used in PAR to engage the stakeholders as shown in Figure 4.2.

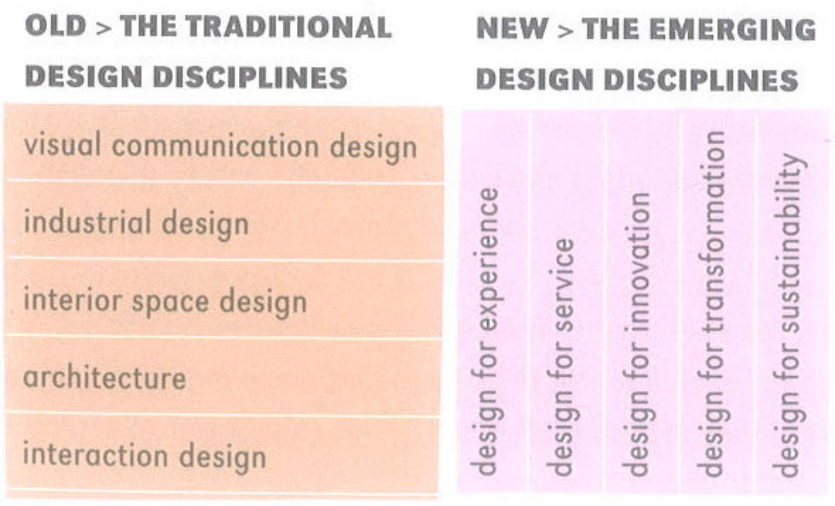
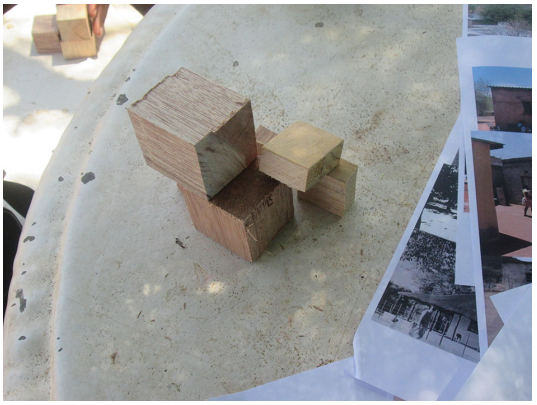


FIGURE 4.1: Transforming from focus on objects (old) to focus on the purpose of design (new). *Source*: (Sanders and Stappers, 2012, p. 17).

(A)



(B)

FIGURE 4.2: Using drawings, models and pictures to explore possible 'design solutions'.

There are various methods and tools that were used for data collection and data analysis using convivial tools in PAR in this research. These methods are; the focus group, open-ended interviews and participant-observation. A focus group gives the researcher and participants an opportunity to discuss and interact with each other (Kitzinger, 1994, 1995) (see Figure 4.4). The open-ended interviews allows the participants to share their ideas and thoughts and the researchers to gain more insights and focus on a particular topics of interest (Marshall and Rossman, 2014; Strauss and Corbin, 1998). Participant-observation offers the researcher an opportunity not only to observe but to engage in various activities with the participants (Marshall and Rossman, 2014) (see Figure 4.3).

(A)

(B)

FIGURE 4.3: Researcher participating and observing in various focus group activities.

This section has presented methods and tools that allow housing to shift from a functionalist approach of Modernism to an approach with more consideration of social processes or the 'soft sciences' (Alexander, 1985; Fathy, 2010; Hamdi et al., 1995). Many architectural critics and researchers have argued that we need to incorporate cultural values and beliefs in contemporary housing in order to improve the quality of our living environment

(A) (B)

FIGURE 4.4: Participants during focus group workshops.

(Habraken and Valkenburg, 1972; Rapoport, 1998). The challenge for adopting a participatory approach in self-help housing by government or other agencies is the:

> "... need for quantifiable and objectively verifiable indicators..." (Fraser et al., 2006, p. 115).

To address these challenges, this study applied PAR methods through two focus group sessions. A focus group in PAR allows participants to be engaged in the process of finding suitable design solutions (Kitzinger, 1994, 1995). According to Kitzinger (1995, p. 302), focus groups are more appropriate for developing new ideas and for studying people's attitudes and experiences than other approaches. The focus group sessions introduced participants to the concept of a flexible housing strategy, with the expectation that they will adopt this for their own housing design needs. The focus group research offered an opportunity to examine people's knowledge and attitudes towards a 'foreign' idea.

4.4.2.3 Focus groups

A focus group was identified as appropriate for PAR because it allows for research participants to discuss and interact with each other (Kitzinger, 1994, 1995). Focus group research also allows for the systematic collection of data about people' views on particular research subjects. Communication and interaction between participants is an important benefit of a focus group that distinguishes the data generated between a researcher interviewing participants and focus group discussions (Kitzinger, 1995; Morgan, 1997).

Since this was a follow up to the case study research conducted in 2013 and with a different group of research participants, it was important to first give an overview of the research. The introduction also allowed research participants to ask for clarification and

express their views, or talk about their own experiences Krueger (1997b). It is advised by Krueger (1997b, p. 37) that:

> "The first few questions in the focus group discussions allow participants to reflect and think of experiences with the study topic ...".

Krueger (1997b, p. 37) further adds that focus group discussions engage participants with each others' experiences, which enriches their own way of thinking.

In the first focus group, participants were asked to describe and design what they consider to be an ideal house for themselves. Papers and markers were provided to the participants. In the second focus group, participants were asked to describe and use wooden blocks to design an ideal house for themselves. Figure 4.5 shows research participants during both scenario workshops.

(A) Focus group I participants making drawings exploring housing design scenarios.

(B) Focus group II participants using wood blocks to explore housing design scenarios.

FIGURE 4.5: Focus group participants exploring design ideas during the workshop.

Ideally, the outcome of the research should be measured and evaluated with input from the research participants. However, due to time and resource constraints, this was not possible. The outcome of the focus group workshops is presented in Chapter 6.

4.4.2.4 Scenario workshops design

As stated in the previous section, the focus groups were conducted using scenario workshops. The intention of scenario workshops was to study how ordinary people and local builders perceive and understand the importance of the design process in self-help housing in Botswana. It was also a way of understanding people's values, beliefs and preferences towards design processes in housing.

At the beginning of each workshop, participants were given codes to identify them. They were also introduced to the topic of discussion. Questionnaires were also given to each participant to fill out during the workshop sessions. As a beginner in focus group research, the researcher adopted a 'Questioning Route' as opposed to a 'Topic Guide' which is more suitable for experienced moderators (Krueger, 1997b, p. 9). This is because housing is a complex research topic and it is important to be consistent and disciplined in asking questions, especially in focus group discussions. As a result, this improves the quality of data collected, the logical analysis and clearly reports the outcomes of the research (Krueger, 1997b, p. 9). The consistency in questioning also adds to the validity of the data and quality of analysis (Krueger, 1997b, p. 9).

The other important aspect of the focus group research is that questions were written in English but the conversation between participants and the researcher was in *Setswana*; a local language familiar to all the participants. The interviews consisted of open-ended questions which allowed participants to express their experiences and closed-ended questions to focus the research more into design processes in housing (Krueger, 1997b, p. 31). See Appendix A for a sample of focus group research questions.

In addition to questions during the focus group study, photographs of housing from other countries were shown to participants to expand the discussion beyond the local context. Background information on the concepts and ideas of these projects was provided to the participants to fully understand them. This allowed participants to discuss and express their views on housing strategies that were successfully implemented in other countries. Figure 4.6 shows participants studying the Quinta Monroy social housing project by Elemental in Iquique, Chile. The project was introduced to familiarise participants with the flexible design concepts.

It is common in participatory research that physical artifacts are used to involve the users in exploring design processes (Sanders and Stappers, 2012, p. 19). The following activities and scenarios were developed to engage the participants:

- Discussing and expressing their views on the quality of housing in Botswana
- Listing items on the questionnaire

(A) Focus group I workshop. (B) Focus group II workshop.

FIGURE 4.6: Focus group participants looking at the Quinta Monroy incremental housing project from Iquique in Chile, designed by Elemental.

- Rating and choosing items provided by the researcher (for example, see Figure 4.6)
- Drawing a house (see Figure 4.5a)
- 'Playing' with wood blocks to design a house (see Figure 4.5b)

4.5 Fieldwork and data Collection

Data collection and research methods are a series of activities and processes for gathering information related to the research questions (Creswell, 2013, p. 146–147). At this stage, the researcher develops research protocols or written forms for collecting, recording and storing relevant data (Creswell, 2013, p. 147). The following data was collected throughout the course of this research:

- Surveys and interviews
- Observations and photographs
- Drawings and survey maps
- Housing reports and other official documents related to housing and development in Botswana.

Table 4.3 in Section 4.3 illustrates how this data was collected with the sources. As already stated in previous chapters, the academia and the private practices' role in low-income housing is negligible in Botswana. Nevertheless, data was collected from both academia and private practices. Their responses are included in the analysis as part of the case study's "context". An attempt to engage government officials was not successful despite numerous calls and emails to them. The key participants of this study,

that is the end-users, tenants and local builders were involved in the second part in focus group workshops.

The following Sections 4.5.1 to Sections 4.5.5 present a brief introduction to the data collected from Mochudi as a case study and also from the two focus group workshops. A detailed report of this data is in Chapter 5 and 6.

4.5.1 Case study - Mochudi

The primary focus of this descriptive-interpretive qualitative study is to understand self-help housing in Mochudi and explore possible design solutions. The aim is to propose an appropriate design strategy through a participatory process to improve the quality of housing. Data to understand and describe each household or 'case' was collected using a multiple case study (Stake, 2013; Yin, 2014). Each individual household becomes the primary unit of analysis (Stake, 2013; Yin, 2014). 35 households were chosen following a suggestion by Creswell (2013, p. 156) that, a sample strategy for case study research should involve unusual cases and maximum variations to represent diverse cases. This strategy provides different perspectives of cases in the study (Creswell, 2013, p. 157). However, Creswell (2013, p. 156) warns that these cases should not be too extreme that they compromise the research, but should inform the research questions and central phenomenon of the study. Section 4.4.1 addresses 'case' selection methods.

One of the most important factors in case study research is selecting the "case" to study. As the intention was to understand cultural values in self-help housing, Mochudi became what Stake (2013) refers to as an 'instrumental' case because of the self-help housing initiatives and flexible construction already taking place. It is instrumental as it was used as the basis to pursue external interest (Stake, 2013; Yin, 2012); developing a participatory and a flexible housing approach. Therefore, Mochudi offers an opportunity for an in-depth study of a real-life contemporary context to facilitate the development of a design strategy (Stake, 2013; Yin, 2012).

Mochudi was chosen as a case study for its geographical location, historical and cultural background over other potential places of study in Botswana. Bakgatla (the tribal group in Mochudi), have a rich cultural heritage which has been studied extensively by many historians, sociologist, political scientists and cultural anthropologies (see the work of Larsson (1996); Larsson and Larsson (1983); Schapera (1994); Schapera and Forde (1953); Tlou and Campbell (1984) discussed in Chapter 2). The other reason for choosing Mochudi is that the author was previously involved in a design and build project for a charity organization in Mochudi. The project was a collaboration between the students from both the University of Botswana and the Dalhousie School of Architecture, Canada.

Another important consideration were logistical reasons as it was easy to commute cost-effectively.

Although Mochudi was chosen for operational considerations, it also provided an opportunity for critical insights and important lessons on self-help housing and traditional practises. Yin (2014, p. 209) advises that a good case study should lead to an insightful understanding of a case and its internal as well as external complexities.

4.5.2 Semi-structured interviews

Interviews are traditionally used in research data collection to get information on respondents' beliefs and knowledge (Morton-Williams, 1993; Silverman, 2010). Strauss and Corbin (1998) state that an in-depth semi-structured interview approach allows researchers to gain more insight and focus on a topic of interest. See a sample of the semi-structured questionnaire in Appendix B

Interviews were carried out for three months from mid-September to mid-December, 2013. Research assistants were trained for two weeks to familiarize them with the research methodology and research protocol. Handwritten notes were taken during the interview by the research assistants and then transferred into a word document. The word document was then transferred into NVivo 10 software for organization and analysis (QSR International Pty Ltd, 2016).

Extensive interviews were conducted in 35 households in Mochudi. Each interview was two and half hours long on average. Table 4.4 summaries the list of people interviewed, duration of the interview, dates and place of the interview.

Wards	Households	Land acquisition	Number of houses in a yard
Makakatlela	MK-01	Allocated	1
	MK-02	Bought	3
	MK-03	Bought	3
	MK-04	Allocated	1
Boseja	BO-01	Inherited	1
	BO-02	Inherited	2
	BO-03	Allocated	1
	BO-04	Allocated	1
	BO-05	Inherited	2
	BO-06	Allocated	1
	BO-07	Inherited	2
	BO-08	Inherited	2
	BO-09	Allocated	2
	BO-10	Allocated	1
Matamora	MT-01	Allocated	2
	MT-02	Allocated	4
	MT-03	Allocated	1
	MT-04	Inherited	1
	MT-05	Allocated	1
	MT-06	Inherited	2
	MT-07	Allocated	2
	MT-08	Allocated	3
	MT-09	Allocated	2
	MT-10	Allocated	1
Tlagadi	TL-01	Inherited	3
	TL-02	Inherited	2
	TL-03	Allocated	1
	TL-04	Inherited	3
	TL-05	Allocated	2
	TL-06	Inherited	2
	TL-07	Inherited	2
	TL-08	Allocated	2
	TL-09	Allocated	2
Mabudisa	MB-01	Allocated	1
	MB-02	Allocated	2

TABLE 4.4: A list of households, wards, land acquisition and the number of houses per household that were studied. *Source*: Field Survey (2013).

4.5.3 Open-ended discussions - Focus group

The focus group provided an opportunity for in-depth discussion and exploration of appropriate flexible housing methods for self-help housing in Botswana. Focus group

interviews were chosen as an effective data collection method to test and validate the hypothesis (Mullings, 1986) that flexible housing is an appropriate design strategy for self-help housing.

There were two research assistants to assist during the focus group discussions. One assistant was taking field-notes, capturing key comments during the discussions while the other assistant was observing and taking pictures of the activities. The author was the team leader and moderator for the various workshop activities. Unfortunately we were not allowed to record the discussions electronically, which compromises the quality and validity of focus group research as noted by (Krueger, 1997a). However, a detailed record of the discussion even though helpful, was not necessary as the notes were sufficient for this study.

At the end of each focus group research discussion, we met with the two research assistants for a debriefing session. During these sessions, we summarised the discussions and made conclusions for each focus group. The two research assistants were helpful in the analysis and interpretation of the focus group data. Their views and perspectives of the focus group discussions and the collected data, helped in identifying the themes Creswell (2013); Krueger (1997a). This ensures that not only the researcher's views are expressed in the interpretation and reporting of the data Creswell (2013); Krueger (1997a).

4.5.4 Structured interviews - Questionnaire survey

The study adopted a structured questionnaire method to get responses from researchers and professionals in private practice in Botswana. The questionnaires were emailed to different individuals known to the researcher, educational institutions, research centres, professionals associations and government departments involved in housing research and practice. However, no responses were received from government officials despite the numerous efforts to contact them.

A fillable PDF form was created using Adobe's Acrobat XI Pro software (Adobe Systems Incorporated, 2016). Acrobat XI Pro allows forms to be distributed and collects responses automatically into a database (Adobe Systems Incorporated, 2016). A database manages forms that have been distributed, views status of responses and also send reminders to people who have not responded (Adobe Systems Incorporated, 2016). Table 4.5 shows the 10 responses received. See a sample of the survey questionnaire in Appendix C.

Responses collected from the Adobe Acrobat database were converted into Excel. It was not possible to import Acrobat files as datasets directly into NVivo 10 software (QSR

Respondent	Occupation	Education	Research Interest
RP-01	Faculty Dean.	PhD	Infrastructural planning.
RP-02	Lecturer	MSc	Urban planning design, emotive architecture.
RP-03	Architect	M.Arch	Housing
RP-04	Lecturer	PhD	Building materials and project management.
RP-05	Lecturer	PhD	Urban planning and built environment.
RP-06	Lecturer	MSc	Energy efficiency in buildings.
RP-07	Lecturer	PhD student	History of Architecture, conservation and regeneration.
RP-08	Lecturer	MA	Real estate and property development.
RP-09	Architect	B.Arch	Housing.
RP-10	Lecturer	PhD	Urbanization.

TABLE 4.5: A list of the survey questionnaire responses received from the academia and practitioners in Botswana. The table shows their affiliation and education level. Online Survey (2013).

International Pty Ltd, 2016), which was used for the analysis (Bazeley and Jackson, 2013; Walsh, 2003) of all the data set for this study. Analysis of the survey responses using NVivo software is discussed in detail in Section 4.6. It is important to note that even though some of the questions in the survey questionnaire involve rating items, it does not result in using statistical methods for analysis. This research does not apply a mixed-methods approach, only qualitative methods.

4.5.5 Other data sources

Following on the advise given by Yin (2014) and Chava and David (1996), data from various sources is triangulated to enable an "analytic generalization" of the research findings. This is because this study is generalized to a theoretical proposition which allows for "analytic generalization" as discussed in Section 4.4.1.3. The following is a list of other data sources that were collected and analysed:

- **Documents:** Tellis (1997) believes that consulting official documents, letters, memoranda, photographs and newspaper articles can provide useful information for research. (Yin, 2014, p. 108) takes up a similar argument but cautions that it is important that sources of such data and the intentions be known before it

is used for research. Table 4.6 is a summary of documents from different sources that were consulted.

Title	Description	Year	Source
National Housing Policy	A review of the National Policy on housing, based on the Government White Paper No. 2 of 1981.	1997	Department of Housing, Botswana Government.
Botswana Demographics Report	The publication covers the projected population size, composition and distribution as well as various demographic indicators	2006	Statistics Botswana.
Population and Housing Census Report	Publication of information on the socio-economic demographics in Botswana following the 2011 Census.	2011	Statistics Botswana.
Development and Building Control Code	Minimum health and safety standard and codes set by the government to regulate the design and construction.	2013	Building materials and project management.
Botswana Vision 2016 Statement	Development goals that the government of Botswana aims to achieve by year 2016.	2016	Ministry of finance and development planning.
Historical Maps and photographs	Aerial maps and GIS maps of Mochudi over the years.	1970, 1985, 1990, 2001, 2011	National Archives and various libraries.

TABLE 4.6: A summary of documents reviewed as part of data collection

- **Observations:** Architecture research relies more on direct and indirect observation as a way of deriving knowledge from case studies and fieldwork (Groak, 2002; Hamdi, 2010). Even though the direct and indirect observation methods depend largely on the interpretation and interest of the researcher, they are useful in describing and analysing the social and cultural values in housing (Hamdi, 2010; Hamdi et al., 1995).

  The observations were direct in the sense that the researcher was personally involved in the fieldwork study. This enabled the researcher to study the built houses as well as observe and experience various activities taking place in different households. During this process, observations on spatial organization, space use

and spatial quality of each household were recorded. This process gave the researcher first hand information (Tellis, 1997; Yin, 2014), by examining the quality of the existing houses within Mochudi to make a comparative study with other places. However, only the outside observations were noted because we were not given access to the indoor spaces.

It was during the interviews that some information that could not be directly observed was revealed. As a result, there was an indirect observation about people's values and attitude towards housing (Tellis, 1997; Yin, 2014). Another important observation was the information about the transformation of houses that happens over time. The fieldwork was for three months and such information could only be recorded from indirect observation.

- **Photographs and drawings:** Photographs and drawings provide visual evidence of the housing forms and activities within them (Prosser, 1998). They compliment what was recorded using other data collection methods such as interviewing and observations (Prosser, 1998). The drawings and photographs are used with text to tell a visual story about housing and culture in Mochudi (Prosser, 1998).

- **Survey maps and physical survey:** One of the research assistants is a technician specializing in geographic information system (GIS) at the Department of Architecture and Planning at the University of Botswana. GIS is an important skill in measuring, recording and analysing physical form. A Trimble Geo 7 Series hand-held device from the Trimble GeoExplorer was used to collect geospatial data (Trimble Navigation Limited, 2016). The data was imported into ArchGIS software to plot the space and building footprint from the fieldwork (Trimble Navigation Limited, 2016). The drawings were converted to a CAD format which could be analysed using many CAD softwares that are commonly used in architecture.

  In addition to the maps produced from fieldwork study, aerial photographs taken in 1985, 1992, 2001 and 2011 were sourced from the Department of Surveys and Mapping (DSM) (see Figure 4.7, 4.8 and 4.9). The maps helped to understand the transformation of Mochudi over the years. The maps also allowed us to locate the households that were studied by superimposing data from fieldwork onto the maps.

FIGURE 4.7: Mochudi in 1985

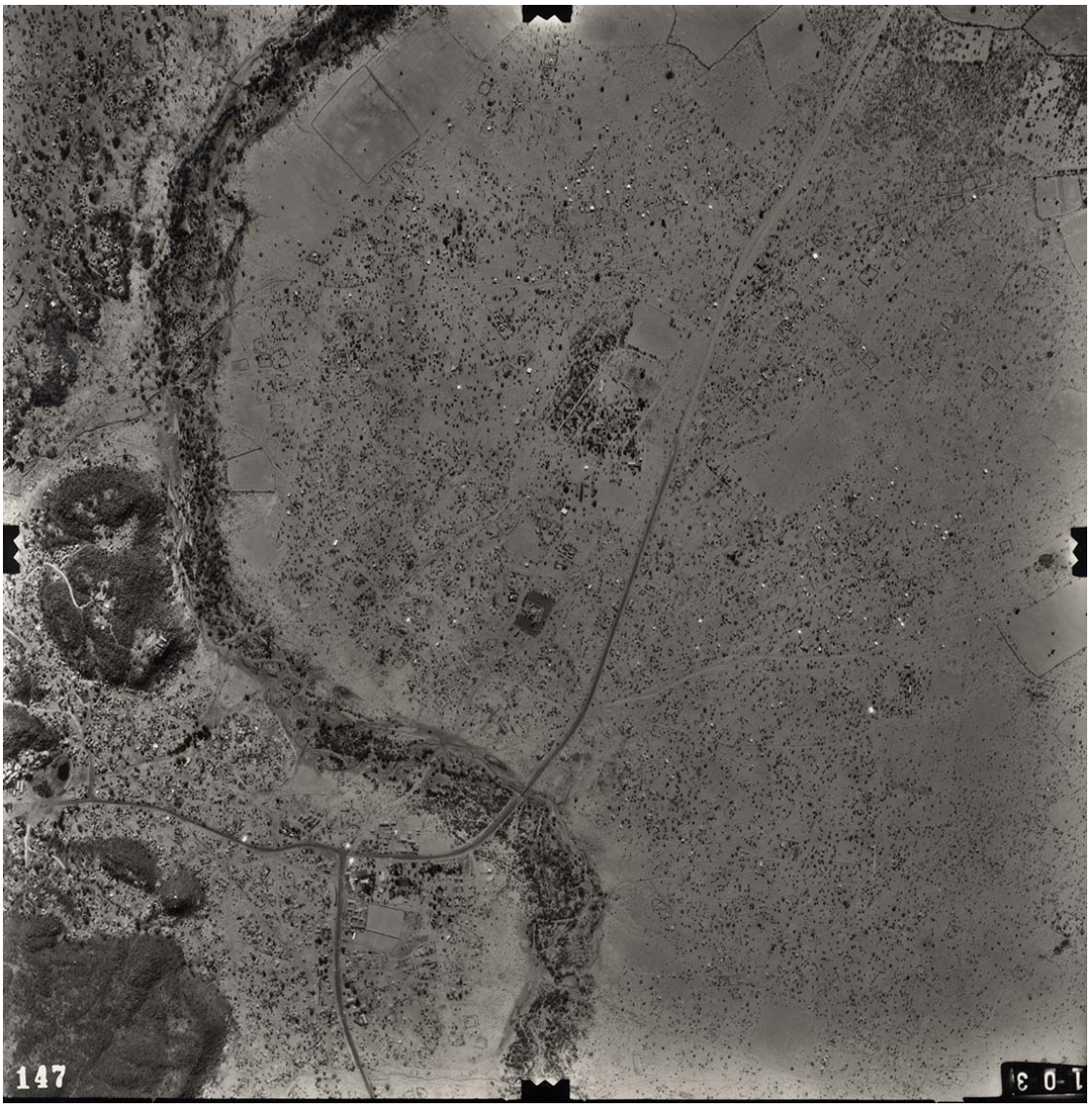


FIGURE 4.8: Mochudi in 1985

FIGURE 4.9: Mochudi in 2011

4.6 Data analysis techniques

The research produced a huge amount of data which is typical of qualitative research methods (Stake, 2013; Yin, 2014). This data was collected from interviews, field-notes, literature, photographs and documents mostly in Mochudi. A systematic approach was adopted to organize and code all the data (Saldaña, 2012, p. 141). All the handwritten field-notes were transferred to Microsoft Word to be stored with other electronic datasets. The data corpus was imported into NVivo software for sorting, organizing, and systematic analysis (Bazeley and Jackson, 2013; Walsh, 2003).

NVivo (see Figure 4.12), is one of the Computer Assisted/Aided Qualitative Data Analysis Software (CAQDAS):

> "...tools that assist with qualitative research such as transcription analysis, coding and text interpretation, recursive abstraction, content analysis, thematic analysis discourse analysis, grounded theory methodology..."(Wikipedia, 2016).

This study used NVivo 10 developed by QSR International Pty Ltd (QSR International Pty Ltd, 2016) and licensed to the University of Bath. The availability of NVivo at the University was also one of the reasons for choosing NVivo because it is widely used for qualitative analysis by many other researchers (Bazeley and Jackson, 2013; Walsh, 2003).

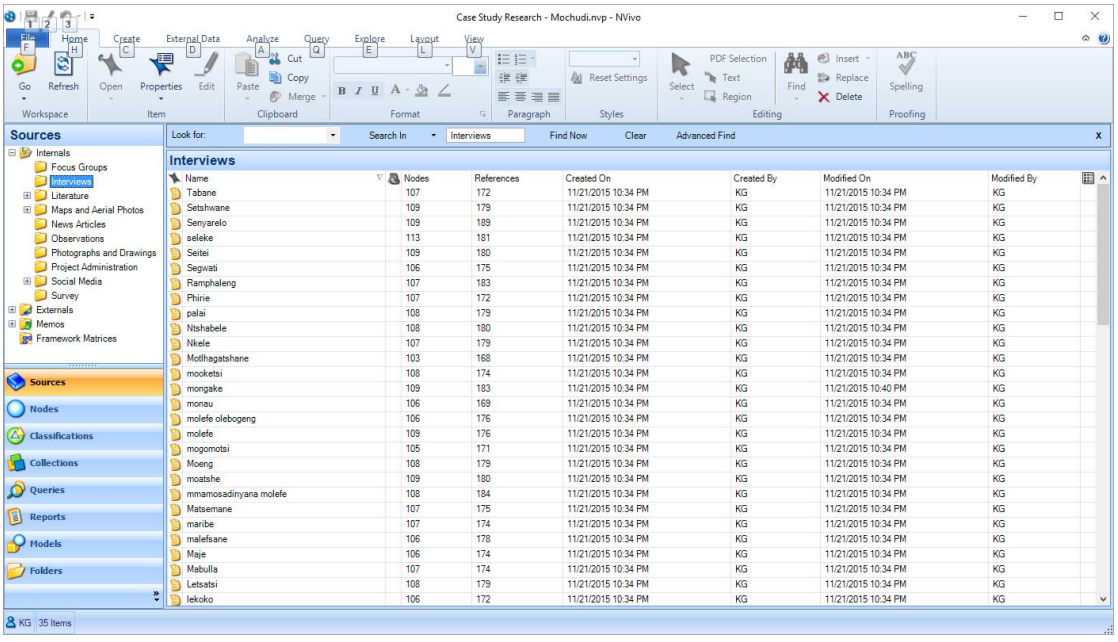


FIGURE 4.10: Research data imported into NVivo 10 program developed by QSR International Pty Ltd, an Australian company. NVivo was used for organizing the research data and for data analysis.

Thematic analysis method was used for:

"...identifying, analysing, and reporting patterns (themes) within the data "(Braun and Clarke, 2006, p. 6).

Thematic analysis is one of the analysis tools used to conduct analysis across different research methods (Boyatzis, 1998; Braun and Clarke, 2006). Braun and Clarke (2006) describes thematic analysis as a method that is not specific to any theoretical or epistemological positions. It offers flexibility not found in theoretical analysis tools such a grounded theory, discourse analysis or narrative analysis (Braun and Clarke, 2006, p. 4). These other analysis methods do not make the process explicit and are often limited to theoretical frameworks (Boyatzis, 1998; Braun and Clarke, 2006). On the other hand, thematic analysis provides the flexibility to relate to a diverse and complex data and the research questions without being limited to any pre-existing theoretical frameworks (Braun and Clarke, 2006, p. 9).

4.6.1 Thematic analysis

The use of thematic analysis and its relevance to this study is premised on its application in other fields such as housing, cultural anthropology, history, sociology and behavioural science research (Boyatzis, 1998; Rapoport, 1983, 1990). It is commonly used by researchers from these fields to analyse verbal, visual and textual data (Boyatzis, 1998, p. 6). According to Boyatzis (1998, p. 4), thematic analysis:

"...is not another qualitative methods but a process that can be used with most, if not all, qualitative methods ...".

Thematic analysis helps to organize, process and analyse qualitative data more effectively (Boyatzis, 1998, p. 5). It also helps in preventing, collecting and reporting on irrelevant data or information, especially for such a broad and complex subject as housing (Yin, 2012). Boyatzis (1998, p. 4) further adds that:

"Thematic analysis is a process of encoding qualitative information".

Another advantage is that a methodical approach of thematic analysis improves confidence in the accuracy of the observations and interpretation by the researcher (Boyatzis, 1998, p. 5). Krueger (1997a, p. 10) notes that,

"Systematic analysis procedures help to ensure that the results will be as authentic as possible ".

It is important to understand that thematic analysis is a process, not a qualitative method such as narrative research, grounded theory, phenomenology and ethnography (Boyatzis, 1998, p. vi). As already stated this research uses case study research and

participatory action research; both qualitative methods. In both of these research methods, a thematic analysis approach is applied to categorize the data into themes (Creswell, 2013, p. 186). The two research methods share the same research questions which makes it easy to manage, identify and organize themes (Herbert and Rubin, 1995).

Themes as defined by Auerbach and Silverstein (2003, p. 38) are a way of clustering a group of repeating ideas. As explained by Herbert and Rubin (1995), themes can be ideas from research participants or conceptual topics developed by the researcher. The themes of this study were first generated deductively from the research goals, conceptual framework and literature review as advised by Boyatzis (1998, p. 4). Secondly, the themes and codes were developed inductively from the collected research data, following on Boyatzis (1998, p. 4) approach. Figure 4.11, illustrates thematic codes and themes developed from literature and from the raw data.

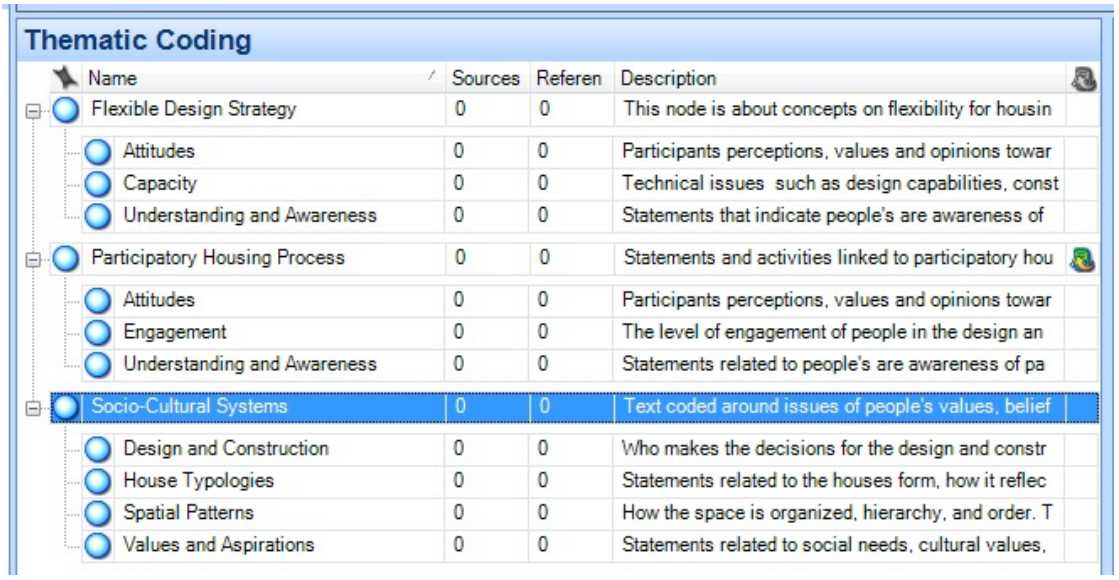


FIGURE 4.11: Thematic Coding in NVivo illustrating the process of developing codes and themes from literature and raw data.

The categories and themes were developed from the first cycle of analysis through a 'Structural Coding' process and prior research. The meaning and the process of developing the codes and themes from the raw field data, and application of structural coding is presented in Section 4.6.3. These themes and concepts were reviewed and rewritten to develop research-generated *theoretical constructs* as wisely advised by Saldaña (2012, p. 142).

4.6.2 Prior-research-driven code development

As noted by Boyatzis (1998, p. 34–40) it is common to formulate themes and codes based on prior research. The reason for this is that there already exist 'professional standards' and 'practices' in various disciplines, which makes it easier for them to be accepted as methods of study (Boyatzis, 1998, p. 33–34). However, Boyatzis (1998, p. 35–37) emphasises that themes and codes that are driven by previous research and conceptual framework, should be revised and reviewed in the context of the raw data. This approach, as noted by Boyatzis (1998, p. 37), results in higher interrater reliability and validity. However, Boyatzis (1998, p. 37) cautions that:

> "...the use of prior data and research as the basis for development of a code means that the researcher accepts another researcher's assumptions, projections, and biases".

However, this research does not use data or codes from previous research except for the conceptual framework from literature reviews. The concepts from literature were reviewed and revised to develop themes and codes for this research. Boyatzis (1998, p. 37) states that this provides an effective approach to contribute to knowledge.

The conceptual framework developed by Lawrence (2000) on integrated approach to housing availability, affordability and quality in various social context, provides a basis to develop themes and codes for this research. Four concepts that were developed by Asquith (2005, p. 135) to study seventeen families in the UK and the way they used spaces, were also reviewed and rewritten to develop themes for this study. The concepts are; *anthropological approach*, *sociological approach*; *behavioural approach* and *architectural approach* (Asquith, 2005, p. 130–131). These concepts developed by Lawrence (2000) and modified by Asquith (2005), provide a basis to develop the *theoretical constructs* for this study (discussed in Section 4.7).

4.6.3 Coding of data

Coding data allows for easier sorting and identification, and analysis of qualitative data (Boyatzis, 1998; Silverman, 2011). Questions and responses are given consistent codes and labels to make reliable and valid inferences from the data (Boyatzis, 1998; Silverman, 2011). Related information and categories are easier to extract, manipulate and analyse in a coded system (Silverman, 2011). It was important to adopt thematic and coding strategies for this research because various methods were used to collect data, resulting in a huge amount of complex data sets.

Boyatzis (1998) has developed a three stage process of developing themes and codes for thematic analysis in qualitative research. These methodologies developed by Boyatzis (1998) for thematic analysis are applied in this study as follows:

1. **Stage I: Sampling and design issues**

   The data corpus was collected from various sources as already described in Section 4.5 The sampling of data, the research design and units of analysis were discussed in Section 4.4.

2. **Stage II: Developing themes and a code**

   According to Boyatzis (1998, p. 35–52), there are 3 to 5 steps in developing themes and codes depending on a deductive or inductive approach. These steps are: (a) reducing the raw information, (b) identifying themes within subsamples, (c) comparing codes across subsamples, and (d) creating a code, and (e) determining the reliability of the code (Boyatzis, 1998, p. 35–52). The fifth step does not apply in this study because the codes and themes were not reviewed or tested by an external person during the developing process. The steps of this stage are discussed in the following items:

   (a) **Step I: Reducing the raw information:** There is an enormous amount of qualitative data collected from survey questionnaires, case study research and focus group research. The challenge was to organize this raw information for easier processing and analysis (Boyatzis, 1998; Silverman, 2011). As the first step in developing themes and codes, 'Attribute Coding' was applied to the data corpus (i.e., interview transcripts, field notes, documents, artifacts, pictures). Attribute coding is all the descriptive information related to the demographics (e.g., gender, age, ethnicity) and data format (e.g., interview transcript, field note, document) of the participants and place of study (Saldaña, 2012, p. 55). It is also an opportunity for the researcher to review the raw data and become familiar with each unit of analysis of the subsamples (Boyatzis, 1998, p. 45). Saldaña (2012, p. 56) recommends this approach as a:

   > "... good qualitative data management and provides essential participant information and contexts for analysis and interpretation".

   (b) **Step II: Identifying themes within samples:** The semi-structured interviews, survey questions and focus group questionnaires were organized into major conceptual themes specific to addressing the research questions. As a result, it was necessary to follow the attribute coding with a 'Structural Coding' process (see Figure 4.12); a content-based approach of coding raw information

(Saldaña, 2012, p. 66). Content-based coding is widely used in developing data-driven inductive coding in thematic analysis Boyatzis (1998, p. 41). It was necessary to categorize the data corpus using 'Structural Coding' as a foundation for further detailed coding (Boyatzis, 1998; Saldaña, 2012), and develop nodes for theoretical constructs presented in Section 4.6.2. The following is an example of developing 'Structural Coding':

> *Research Questions: How important is the role of dwellers, local builders and design professionals (e.g. architects) in the design decision-making process in housing?*
>
> Structural Code: DESIGN AND CONSTRUCTION PROCESS

Structural Coding

Name	Sources	Referen	Description
Design and Construction Pr	38	350	The approach in the design and constru
Design and Construction Qu	36	349	Evaluation of what people like the most
Household activities and Sp	0	0	The social activities that people perform
Housing Challenges	0	0	What could be causing housing proble
Affordability	3	62	Affordability issues. Any financial relate
Building Regulations	2	27	If building regulations are making it diffi
Design and Constructio	2	37	Design and Construction Methods and
Land Management	3	30	Statements related to land and housing.
Policies	3	37	Policies not addressing the challenges
Socio-Cultural	2	53	Our values and expectation not being m
Housing Policies	2	92	What are the exisiting housing policies
Modernity and Traditional	37	218	An individual's understanding and attitu
Rules and Regulations	36	181	People's understanding of building rule
Social and cultural activities	36	114	The rituals, values and social activites t
Social Networks	35	211	Text coded around household relations
Socio-Cultural Systems	0	0	What are people's values, beliefs and a
Thermal Comfort	35	104	How people deal with changes in tempe
Typologies and Spacial For	0	0	What are the existing typologies and th
Use of Traditional Materials	35	39	People's views and attitude towards the

FIGURE 4.12: Categorizing the data corpus using 'Structural Coding' in NVivo.

However, Structural Coding results in basic and broad categories, themes and ideas which require further detailed analysis (Saldaña, 2012, p. 68). Structural Coding is similar to what Boyatzis (1998, p. 69) refers to as an 'outline' for easier comparison of codes across units of analysis. For further detailed

coding, data analysis and theory development, a thematic analysis approach was applied Saldaña (2012, p. 69).

(c) **Step III: Comparing themes across subsamples:** The themes that emerged from Structural Coding were identified and compared across all the subsamples. This step reduces the raw information into manageable sizes by identifying similar patterns across the subsamples (Boyatzis, 1998, p. 47). Boyatzis (1998, p. 47) advises that at this step, the focus should be on developing themes and codes without imposing any theoretical or conceptual framework. However, this research is not as data-driven as a narrative or grounded theory research (Creswell, 2013). Therefore, the themes and the codes are not only dependant on the collected data (inductive process) but also on prior-research information (deductive process).

(d) **Step IV: Creating a code:** At this step, the themes developed in Step III are reviewed and rewritten to clarify the research phenomena (Boyatzis, 1998, p. 90). For example, during the first cycle of analysis using the Structural Coding, themes were developed that relate directly to the research questions and aims of the study. These themes were developed for each unit of analysis for each household interview, focus group interviews and survey questions. However, these observable themes are at a manifest level rather than at a latent level (Saldaña, 2012, p. 141). The following example is taken from the questionnaire to illustrate themes at manifest level and at latent level.

> *What do you like most about your house? Form, Space, Materials, etc.?*
>
> Manifest themes; The **form**, the **plan is good**, sitting room **at front** and beds **at back**.
>
> Latent themes; Aesthetics, Spatial Organization and Spatial Hierarchy.
>
> *What do you like the least about your house? Form, Space, Materials, etc.?*
>
> Manifest themes; The roofing is **leaking**.
>
> Latent themes; Construction Quality.

Thematic analysis develops these themes into conceptual ideas through interpretation (Boyatzis, 1998; Saldaña, 2012). The themes and concepts developed through a thematic process are at a latent level Saldaña (2012, p. 141).

3. **Stage III: Using and validating a code**

   At this stage, the code is applied to the entire data set as a process of cross-checking and validation (Boyatzis, 1998, p. 50–51). This method involves visually comparing raw information from each sub-sample to the themes and codes developed for the research (Boyatzis, 1998, p. 50–51).

4.7 Theoretical constructs

Concepts and theories from prior-research were reviewed to develop themes for this research (deductive analysis). However, some of the themes were developed from the raw data from case study research, survey questions and focus interviews conducted in Mochudi (inductive analysis). As noted in Section 4.2 discussing the procedures and logic used in this research, the data analysis follows both deductive and inductive logic (Eriksson and Kovalainen, 2008). As a result, researcher-generated theoretical constructs were developed. This forms the basis for a structured approach in data collection and data analysis (Yin, 2012).

It is important to make a distinction between a theory, theoretical constructs (at times called hypothetical constructs), and the operational definitions or variables of a construct. Table 4.7 gives the theoretical constructs, the nominal definitions of the construct, and the operations definition (variable) of the construct (Fellows and Liu, 2015, p. 73–77). Theoretical constructs are defined as conceptual models derived from theories (Fellows and Liu, 2015, p. 75). It is important that constructs are clearly defined to avoid broad and ambiguous interpretations (Fellows and Liu, 2015, p. 73–77). This can be achieved by incorporating two important components of theoretical constructs; a theoretical or nominal definition of the construct, and an operational definition (variable) of the construct (Fellows and Liu, 2015, p. 75).

Theoretical or nominal definition clearly outlines the meaning and the intention of a construct (Fellows and Liu, 2015). It is usually based on existing literature even though it can be developed for a specific study (Fellows and Liu, 2015). Theoretical definitions are usually too general and abstract, and need to be reviewed for a specific construct (Abend, 2008; Selg, 2013). To avoid ambiguity about the meaning of a theoretical definition, researchers usually develop a number of perspectives to be more specific about the meaning of a construct as illustrated in Table 4.7.

Perspectives within theoretical constructs are empirically tested using operational definitions (variables) (Fellows and Liu, 2015). It is at this stage that the research hypothesis and

TABLE 4.7: Theoretical constructs developed from literature and also from raw data. Theoretical and operational definitions are given to clearly state the meaning and intention of each construct.

Theoretical Construct	**Theoretical Definition**	**Perspectives and Operational Definitions**
Socio-cultural systems	This examines how social structures, beliefs and cultural values are reflected in housing and settlement patterns in Mochudi.	Perspective I: Values and aspirations - Examines the Social needs, cultural values, ritual practices, and aspirations. Perspective II: Spatial patterns - Architectural space at it relates to the relationship between space use, hierarchy and activities patterns. Perspective III: House typologies - Examines the house form, aesthetics and style, and how it relates to the local culture, local climate, local technology and materials. Perspective IV: Design and construction - Examines the roles and responsibilities, decision-making process, tools and methods used in the design and construction of houses.
Participatory housing approach	This examines the statements and activities linked to participatory housing policies, enabling frameworks and inclusive housing design from the fieldwork. This could be statements about engaging other professionals, users and builders.	Perspective I: Attitudes - Examines the participants' perceptions, values and opinions. Perspective II: Engagement and willingness - Examines the level of engagement of the users. Perspective III: Understanding and awareness - Examines participants' understanding and awareness of participatory design.
Flexible housing strategy	This examines the statements and activities that were used to introduce the concept of flexible housing in a focus group conducted in Mochudi. It also examines the role of end-users and local builders in design and construction of self-help housing.	Perspective I: Attitudes - Examines the participants' perceptions, values and opinions. Perspective II: Capacity - Examines the technical issues, design capabilities, construction technology, building materials, building regulations that might prevent introducing such a concept in Botswana. Perspective III: Understanding and awareness - Examines participants' understanding and awareness of flexible housing.

theoretical constructs are confirmed or rejected (Abend, 2008; Fellows and Liu, 2015; Selg, 2013).

4.8 Validation

Qualitative research offers an advantage over other methods because data comes from a variety of sources (Creswell, 2013; Flyvbjerg, 2006; Yin, 2012, 2014). According to Yin (2012, p. 13), qualitative research approach offers an opportunity to:

> "triangulate data - or establishing converging lines of evidence ..." (Yin, 2012, p. 13).

However, data collected from fieldwork presents credibility challenges of both the researcher and the researched (Flyvbjerg, 2006; Yin, 2014). Yin (2012; 2014) submit that evidence from fieldwork is likely to be challenged. In order to address these challenges, it has always been the practice in qualitative case study research that validation and evaluation procedures must be developed and established to avoid errors and bias in data collection and analysis (Flyvbjerg, 2006; Stake, 2013; Yin, 2012, 2014). There are four tests commonly used to determine the quality of the research design (Yin, 2014, p. 45–50). Table 4.8 gives a summary of three of the four tests as developed by Yin (2014, p. 45), and how they are used in this research. The fourth test which is internal validity is usually applied in explanatory and causal case study research which does not apply in this study (Yin, 2014, p. 45–50).

Test	**Case Study Tactic**	**Phase of research in which Tactic Occurs**
Construct validity	• Use of multiple sources of evidence	Data collection (see Section 4.5
	• Establish chain of evidence	Data collection (see Section 4.5)
	• Have key informants review draft case study report	Composition (See Chapter 5)
External validity	• Use theory in single-case studies	Research design (see Section 4.4)
	• Use replication logic in multiple-case studies	Research design (see Section 4.4)
Reliability	• Use case study protocol	Data collection (see Section 4.5)
	• Develop case study database	Data collection (see Section 4.5)

Table 4.8: A table showing the various validation design tests and their application.

The three design test in Table 4.8 and their application in this study are discussed in Section 4.8.1 to 4.8.3.

4.8.1 Construct Validity

According to Yin (2014, p. 45–49), the main criticism of qualitative case study research is the lack of operational measures to prevent researchers' bias. This is certainly the case with housing, culture and behavioural research (Oliver, 2010; Rapoport, 1969b). This is because housing is a highly subjective research area that is prone to personal opinions (Kent, 1990; Oliver, 2010). This result in bias and errors in data collection and analysis (Yin, 2014). This is addressed by clearly defining the philosophical assumptions, clearly defining cases to study, and making theoretical propositions explicit.

4.8.2 External Validity

Section 4.4.1 discusses the importance of analytic generalizations to a theoretical proposition. This approach allows the research findings to be applied to other contexts beyond Mochudi (Yin, 2012, p. 18). It is impossible to collect data from all the available 'samples' or 'cases', but with theoretical propositions, findings from self-help housing study in Mochudi can be generalized for other contexts. Also, this study involves multiple case study research which increases the possibility of a direct replicability to various cases (Yin, 2014, p. 64). Being able to the apply concepts and principles from this research to other contexts is a clear demonstration of external validity.

4.8.3 Reliability

Qualitative research methods are not reliant on any standardized or coded methodological approach of observation and documentation (Flyvbjerg, 2006; Robson, 2002; Yin, 2014). It is therefore important that great care is taken in research design to allow for replicability (Yin, 2014). This can be achieved by developing comprehensive research methods and procedures, which are well described and well documented (Robson, 2002; Yin, 2014). This helps to avoid bias in the collection and analysis of qualitative research data, against subject error, observer error, subject bias and observer bias (Robson, 2002; Yin, 2014). A clearly stated method of observation and documentation allows others to replicate the research, and get reliable results (Yin, 2014).

A flexible housing approach to self-help housing is an important research area not only for Botswana but also for other developing countries that are struggling with

housing challenges (Correa, 2000; Habraken and Valkenburg, 1972; Hertzberger, 2005). Therefore, flexible housing and self-help housing are important research areas which eliminate subject error and bias in this research. There were two research assistants conducting fieldwork research with the researcher, which helps eliminate researcher's bias in the recording and documentation of data. With more people involved in data collection and recording, it reduces observers error and bias significantly. The second fieldwork was based on the analysis of the first fieldwork, which also adds to data validity and reliability. During the second fieldwork, focused groups consisting of a mixture of owners and builders participated in the research. The diversity of the people involved increased data validity and reliability. Also the two research assistants took part in the analysis of the focus group, giving the research other views different than that of the researcher. This discussion demonstrates efforts were made to reduce bias and error in the collection, analysing and reporting of data.

Another possible method of validating the research is to have another person apply the code and the themes developed in this research to the same raw information independently (Boyatzis, 1998, p. 49–50). This process determines the interrater reliability, or the degree of consistency (Boyatzis, 1998, p. 49–50). Unfortunately this process could not be used here because of the resources and time required to carry out this process.

4.9 Limitation of the Data

There are two main data limitations commonly associated with qualitative research (Creswell, 2013; Guba et al., 1994). Firstly, the research methodologies chosen are not based on any standard format for this type of research. Rather it is a choice by the researcher after extensive literature review but that does not eliminate all elements of bias and error. Another researcher may choose to use a different methodology depending on their area of interest, resources and their level of expertise. Secondly, the selection of 'cases' to study depends on various factors such personal interest and the willingness of participants. This makes the research prone to selection bias which compromises the findings.

Some of the specific challenges experienced during fieldwork are as follows:

- People were not willing to take part in the research because there was no reward (payment) for them. It was difficult to convince people to leave their daily activities for something they felt was of no benefit to them.

- Lack of motivation from people to be part of the research. People in poor communities are strained by their own social problems that they are not motivated by what they perceive as unimportant to their lives.
- There is also a general lack of trust for people from outside. As an outsider, people are usually suspicious of your motives and are reluctant to talk to anyone they do not know.
- Organizing focus group workshops was the most challenging aspect because of conflicting schedules amongst people.

Despite these limitations, efforts were made to maximize credibility and reliability of the study (Creswell, 2013; Guba et al., 1994). To overcome some of the challenges, the following steps were taken:

- Refreshments and food were offered to appreciate the time and contribution that participants made to the study.
- Refreshments were also some form of icebreakers that made it easy for people to talk freely. Eating together with the participants also made the conversation less formal and that eased people into having a discussion about many other things that were not part of the interview.
- Participants for the focus group workshop were organized through a local builder known to the researcher from a previous project. The workshops were conducted at a community center allowed people to gather together at the same time. Familiarity of the place and people helps build trust between the researcher and the researched.
- The known contacts introduced the purpose of the research and the researcher to the participants. Letting a local person introduce the research, was also important in building trust and making people comfortable with the aims of the study.

4.10 Conclusions

This chapter presented the research methods and research designs that address the research questions and research aims of this study. Philosophical positions and theoretical assumptions that inform the research problems, research questions, data collection and data analysis were also discussed. An overview of the link between interpretive frameworks and the philosophical assumptions was given.

There are two qualitative research methods used in this study: first is the case study research, which forms the basis for the second method - a participatory action research

(PAR) through a focus group. These two qualitative research methods were used collect data and analyse data mainly from Mochudi. Thematic analysis was used as a tool to analyse collected data from various sources.

Theoretical constructs were developed as a basis for a structured approach of data collection and data analysis. The research methodology also addresses the challenges of research validity and reliability which is a common problem for qualitative research.

Chapter 5

Case study - Mochudi

5.1 Introduction

The aim of this chapter is to present how social structure, beliefs and cultural values are reflected in the physical structure and spatial organization of housing and settlement patterns. This forms the basis for exploring appropriate design strategies for housing in the next chapter.

Chapter 4 introduced the case study research methodology and the themes of this research. This chapter presents the key findings of the case study as conducted in Mochudi and how they are reflected in the physical structure and spatial organization of housing and settlement patterns.

5.2 Households profile

A total of 35 households in five different wards in Mochudi were surveyed and observed over a period of three months; September to November in 2013. 43 % of the respondents were males and 57 % were females. 74 % of the respondents were house owners while only 26 % were tenants (see Table 5.1). Amongst the 26 house owners, 6 % were aged below 50 years old and the remaining were aged 50 years old and above. Table 5.1 is a reflection of gender and tenure status of the respondents. The table shows that more female headed households were interviewed because it was easier to find them home.

9 % of the respondents were retired, and only 6 % of the respondents were still in employment. 37 % were self-employed, and the remaining 48 % were unemployed. This means that 85 % of people are either unemployed or depend on unreliable sources of

TABLE 5.1: Cross-tabulation of gender with tenure status of the respondents. There are more female heads household interviewed because it was easier to find them at home.

		Gender					
		Males		Females		**Total**	
		count	%	count	%	count	%
Tenants Status	Owners	10	28.6	16	45.7	26	74.3
	Tenants	5	14.3	4	11.4	9	25.7
	Total	15	42.9	20	57.1	35	100

income. This is a very high figure of unemployment. However this is not surprising as Table 2.3 in Chapter 2 indicated that (91.9 %) of households in Botswana depends on informal incomes. Many of the people involved in informal employment are builders, carpenters and many other trades in the construction industry.

Unemployment is usually connected to a low-literacy level (Dwivedi et al., 2011). This is no exception to Mochudi. In terms of literacy levels, Table 5.2 shows that 31 % never attended school, while 6 % attended informal education. 37 % attended primary education and 20 % were secondary education leavers. Only 6 % were university or college graduates. These statistics are important because the knowledge and the capacity to adopt new methods and technology requires a certain level of understanding.

TABLE 5.2: Cross-tabulation of gender literacy level with gender. A majority of the respondents have never attended school or gone as far as primary education.

		Gender					
		Males		Females		**Total**	
		count	%	count	%	count	%
Education level	Never attended	4	11.4	7	20.0	11	31.4
	Non-Formal	2	5.7	—	—	2	5.7
	Primary	4	11.4	9	25.7	13	37.1
	Secondary	4	11.4	3	8.6	7	20
	Tertiary	1	2.9	1	2.9	2	5.8
	Total	15	42.9	20	57.1	35	100

Traditionally, people in Mochudi have relied on farming as a source of income (Ama et al., 2011; Cantwell, 2015). Unfortunately, climate and soil conditions have deteriorated over the years, making farming an unreliable source of income (Ama et al., 2011; Cantwell, 2015). As a result, this has forced many people, especially the younger generation, to migrate to cities in search of job opportunities (Dwivedi et al., 2011). It is the only way they can support themselves and their families. The respondents stated that many

of their children and other relatives are either working or attending school in various places. The respondents expressed that they expect their children to be educated to enable them to get high paying jobs. They expected their children to provide for them from their income they earn from formal employment. The following are expectations placed on children or other family members who have migrated to the cities in search of employment; as expressed by the respondents during the interviews:

> "My son is in Selibe Phikwe working in a mine".
> *(Selibe Phikwe is copper mining town in the eastern part of Botswana. It is a four hour drive from Mochudi.)*

> "My daughter is attending school in Gaborone, and stays with my brother who works in the city council".
> *(Gaborone is the capital city which* 40 km *south west of Mochudi.)*

> "My daughter is married and lives in in Gaborone with her husband. My son works in Selibe Phikwe mines".

> "Most of my relatives are working in Jwaneng and Gaborone ".
> *(Jwaneng is another diamond mining town in the south west of Botswana. It is about three hours drive from Mochudi.)*

From the responses given by the interviewees, it was observed that most of those who have moved away from Mochudi are men. This has significantly weakened the farming activities as women do not farm on their own. Similar observation were recorded by Ama et al. (2011) and Silitshena et al. (1990) that men were traditionally responsible for farming, and their absences has decreased income generated from production of crops and selling of cattle (Larsson, 1996).

To compensate for lack of employment in Mochudi, the respondents are engaged in other economic activities in order to generate income for their households. The respondents cited lack of financing as a major challenge which is exasperated by low employment and high construction costs. The respondents' comments on housing affordability are recorded in Appendix D. A few examples of the recorded comments are given below:

> "There is a housing problem; mainly in the rural areas where inhabitable structures are quite dominant. Indicative of the widespread poverty".

> "I think for me I am lucky because I inherited land from my parents and built a house for my family. I would like a bigger house with more space but I do not have the funds".

In terms of developing an appropriate design strategy for self-help housing, this has major implications on what materials and building technology to use for people in this economic and social bracket.

5.3 Settlement patterns and spatial organization of the study cases

Mochudi as a settlement, its history, traditions and customs in the context of Botswana, is discussed in Chapter 2. The reasons for choosing Mochudi as a case study and the process of selecting cases is presented in Section 4.4.1 in Chapter 4. This chapter focuses on the thirty-five households that were selected for this study. Each section begins by briefly describing the wards and the compounds that were surveyed during the fieldwork. The section ends by discussing the individual households that were selected as cases. Important features that help to understand the cultural values and social needs in self-help housing are highlighted.

5.3.1 Village, wards and compounds

A ward is composed of a group of extended families (Hammami, 2012; Larsson, 1996). The extended families are patrilocal in relations, belonging to the same male family lineage (Hammami, 2012; Larsson, 1996). Wards are headed by sub chiefs (headmen), who are usually related to the village chief (Schapera, 1994). The ward, being a distinct unit that organizes family compounds in a horseshoe layout centred on a courtyard *(patlelo)* (Hammami, 2012). According to Larsson (1996; 1983) and Hammami (2012), the location of a particular ward is determined by their social status, with those closer to the chief being near the village center. In the past, the ward was the most efficient and autonomous system to manage a village (Schapera, 1994; Schapera and Roberts, 1975).

In contrast to the traditional wards that were allocated by the village chief through a ward headman (Schapera, 1994), current land allocations are carried out by land boards under the Ministry of Lands and Housing (Ministry of Lands and Housing, 2016). The new allocations follow a grid-like planning approach, unlike the organic layout of the traditional wards which reflect social structure (see Figure 2.16 in Chapter 2). The older plots are much bigger which reflects households of extended families which are common in traditional societies. The new plots are much smaller because modern society live in nuclear families. The fieldwork outcome shows that the new plots are less than half the

size, or even a third of the traditional plots. The fieldwork survey indicates that only three plots were under 500 m^2, and four ranging between 500 m^2 to 1000 m^2. These were mostly in new allocations. For the remaining 28 which are in the traditional wards, the plot sizes range from 1000 m^2 to 2500 m^2.

Table 5.3 and 5.4 show that Mochudi is an area of low density dominated by single storey houses. None of the surveyed plots have a built area of more than 40 %. 71.4 % of the plots have a build area of less than 100 m^2. In addition, the built areas of less than 100 m^2 are found in plot sizes ranging from 1000 m^2 to 2000 m^2. Also, most of the households under study were allocated land under the traditional system. The traditional land systems considered social and cultural activities that took place in a typical Tswana village such as weddings, funerals, and home-based agricultural activities (Larsson and Larsson, 1983; Schapera, 1994).

TABLE 5.3: The density in Mochudi is very low. Many people were allocated plots using the traditional system. The plots were large to allow for social activities such as wedding, funerals, rearing chicken and growing food.

Plot Size (m^2)	**Built Area** (m^2)								**Total**	
	<50		51 - 100		101 - 200		>200			
	Count	%	Count	%	Count	%	Count	%	Count	%
<500	1	2.8	1	2.8	1	2.8	—	—	3	8.6
501 – 1000	1	2.8	2	5.7	1	2.8	—	—	4	11.4
1001 – 1500	5	14.3	5	14.3	2	5.7	1	2.8	13	37.1
1501 – 2000	5	14.3	3	8.6	1	2.8	3	8.6	12	34.3
>2000	—	—	2	5.7	1	2.8	—	—	3	8.6
Total	12	34.3	13	37.1	6	17.1	4	11.4	35	100

TABLE 5.4: Number of houses per plot. Many of these large plots have one or two houses, resulting in a low density area.

Plot Size (m^2)	**Number of Houses in a Plot**								**Total**	
	1		**2**		**3**		**4**			
	Count	%	Count	%	Count	%	Count	%	Count	%
<500	—	—	3	8.6	—	—	—	—	3	8.6
501 – 1000	—	—	3	8.6	1	2.8	—	—	4	11.4
1001 – 1500	6	17.1	4	11.4	2	5.7	1	2.8	13	37.1
1501 –2000	6	17.1	5	14.3	1	2.8	—	—	12	34.3
>2000	1	2.8	2	5.7	—	—	—	—	3	8.6
Total	13	37.1	17	48.6	4	11.4	1	2.8	35	100

It is worth noting that many settlements in Botswana are on a leasehold land tenure system (Kalabamu, 2000). This is a disadvantage to the owners as it denies them access to external financing from commercial institutions for housing (Kalabamu, 2000). This

is also the main reason why more than half the population lives in self-financed and self-built houses.

This section began by introducing the political and social structures found in the settlements, wards and the individual households in Mochudi, and how that has evolved over time. The following sections discuss the houses that were chosen for study based on the physical patterns and social structures. It is important to note that the selections were also driven by the research questions and theoretical perspectives given in previous chapters. This criteria ensured that appropriate houses were identified to study.

5.3.2 Case study houses

Thirty-five households were selected from five different wards as case studies. Houses were chosen from five different wards, namely: Boseja ward (see Figure 5.1), Mabudisa ward (see Figure 5.3), Makakatela ward (see Figure 5.5), Matamora ward (see Figure 5.7), and Tlagadi ward (see Figure 5.9). People in these wards were mostly related and knew each other very well. The wards were composed of compounds of nuclear families and their extended family members.

Due to the limitation of resources and time constraints, only a few cases were studied. However, it was possible to generalize from the few cases using replication logic as described in the research methodology chapter. The following criteria was used to find which houses to study;

- *Cultural identity:* A place reflecting traditional values, beliefs and aspirations. It is also about a place that reflects consideration or lack of, the local culture, local climate, local building materials. Attention was given to how the space is organized, hierarchy of space, use of space and the architectural meaning of the spaces.

- *Self-help housing:* Houses were chosen in areas which exclusively practised self-help housing, as a responsive way to their socio-economic conditions. These houses were either self-funded or partly financed through a loan from the government.

- *Incremental housing development:* Households were chosen in areas that practised incremental or flexible housing development as a socially and economically viable strategy. They were houses built with the capacity to change in future. Additions or changes were made in some houses.

- *User participation in housing:* Houses were chosen from households that owners were actively involved in some capacity of decision-making.

The households that were selected were owner-occupied single storey family houses. The following maps and pictures shows the selected houses under study within their respective wards:

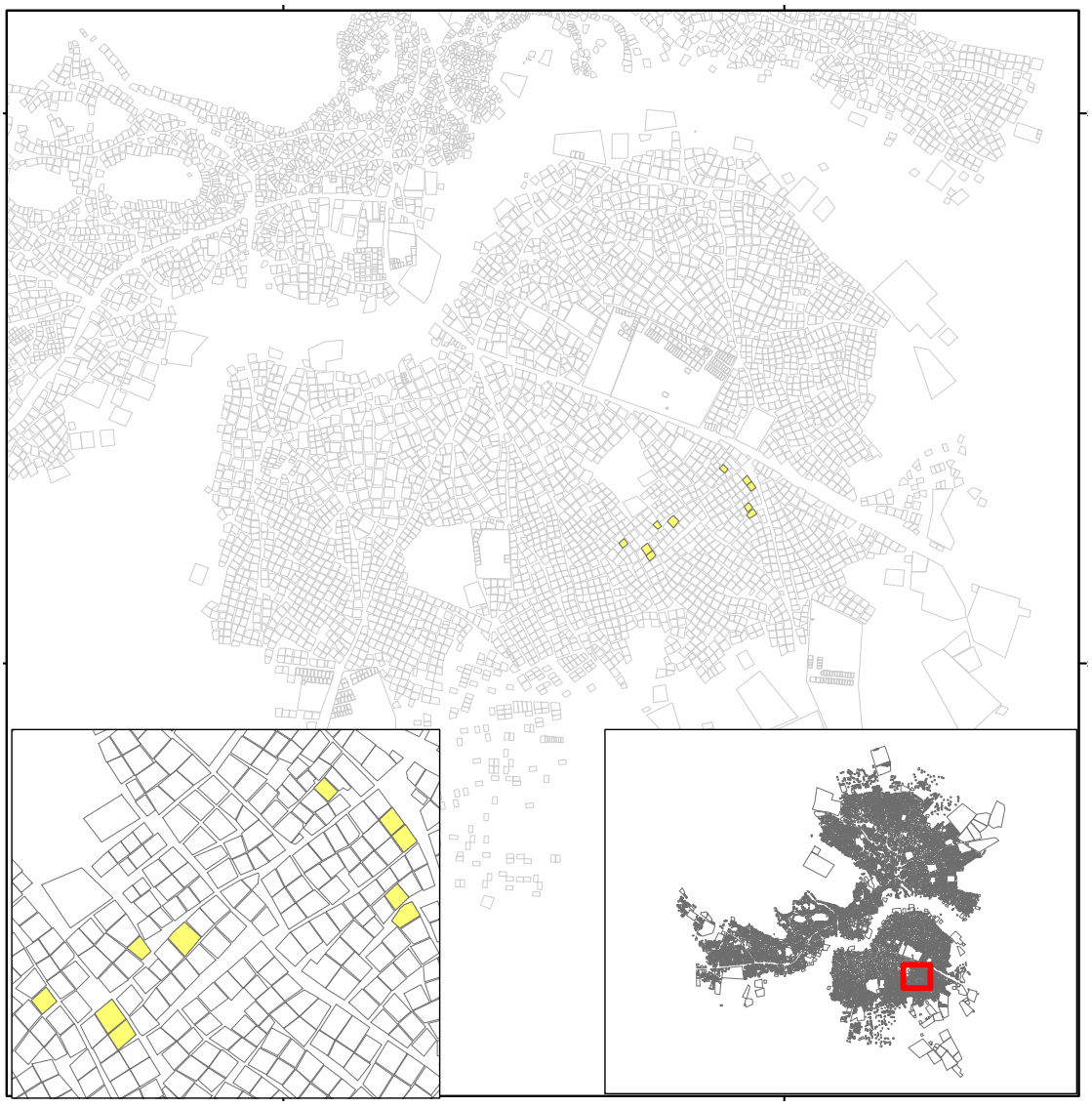


FIGURE 5.1: Boseja ward. *Source*: Superimposed by Author after maps from Department of Surveys & Mapping (2013).

(A) (B) (C)

FIGURE 5.2: Some of the houses selected for study from Boseja ward.

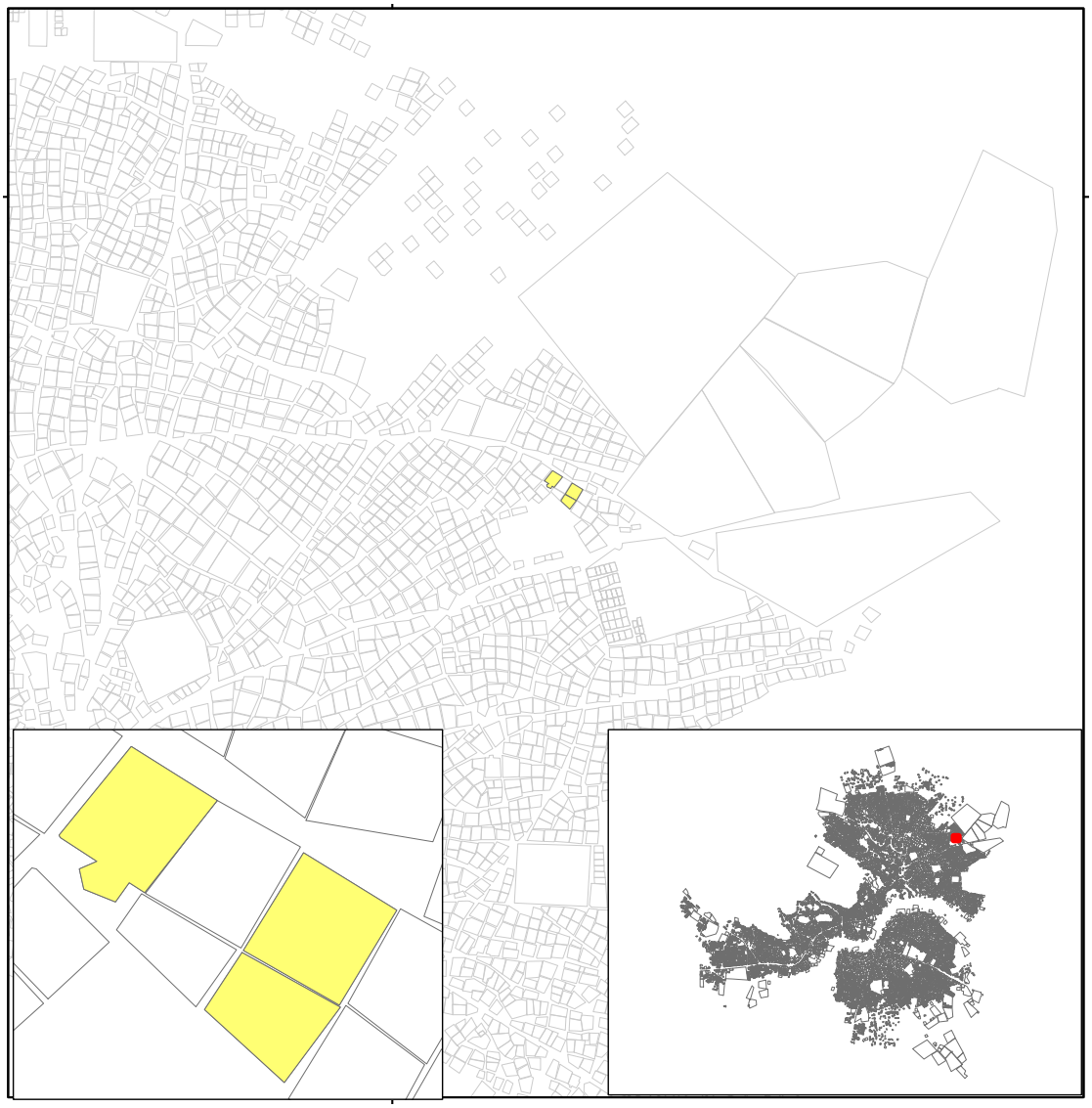


FIGURE 5.3: Mabudisa ward. *Source*: Superimposed by Author after maps from Department of Surveys & Mapping (2013).

(A) (B) (C)

FIGURE 5.4: Some of the houses selected for study from Mabudisa ward.

Table 5.5 shows that many of the households were allocated tribal land before the 1980s; that is when land was readily and cheaply available. The table shows that 31.4 % of the households were occupied before 1980, and 28.6 % occupied between 1980 and 1990,

FIGURE 5.5: Makakatela ward. *Source*: Superimposed by Author after maps from Department of Surveys & Mapping (2013).

(A) (B) (C)

FIGURE 5.6: Some of the houses selected for study from Makakatela ward.

while 14.2 % were occupied between 1991 and 2000. Only 5.8 % were occupied after the year 2000. The occupation date of the remaining 20 % of the households is unknown.

FIGURE 5.7: Matamora ward. *Source*: Superimposed by Author after maps from Department of Surveys & Mapping (2013).

(A) (B) (C)

FIGURE 5.8: Some of the houses selected for study from Matamora ward.

Table 5.5 also shows that only 5.8 % of the land was bought between the period from 1991 to 2000. 60 % of the cases studied were allocated land, with 22.9 % given land before 1980 and 14.2 % with unknown dates of occupation (allocated too long ago for

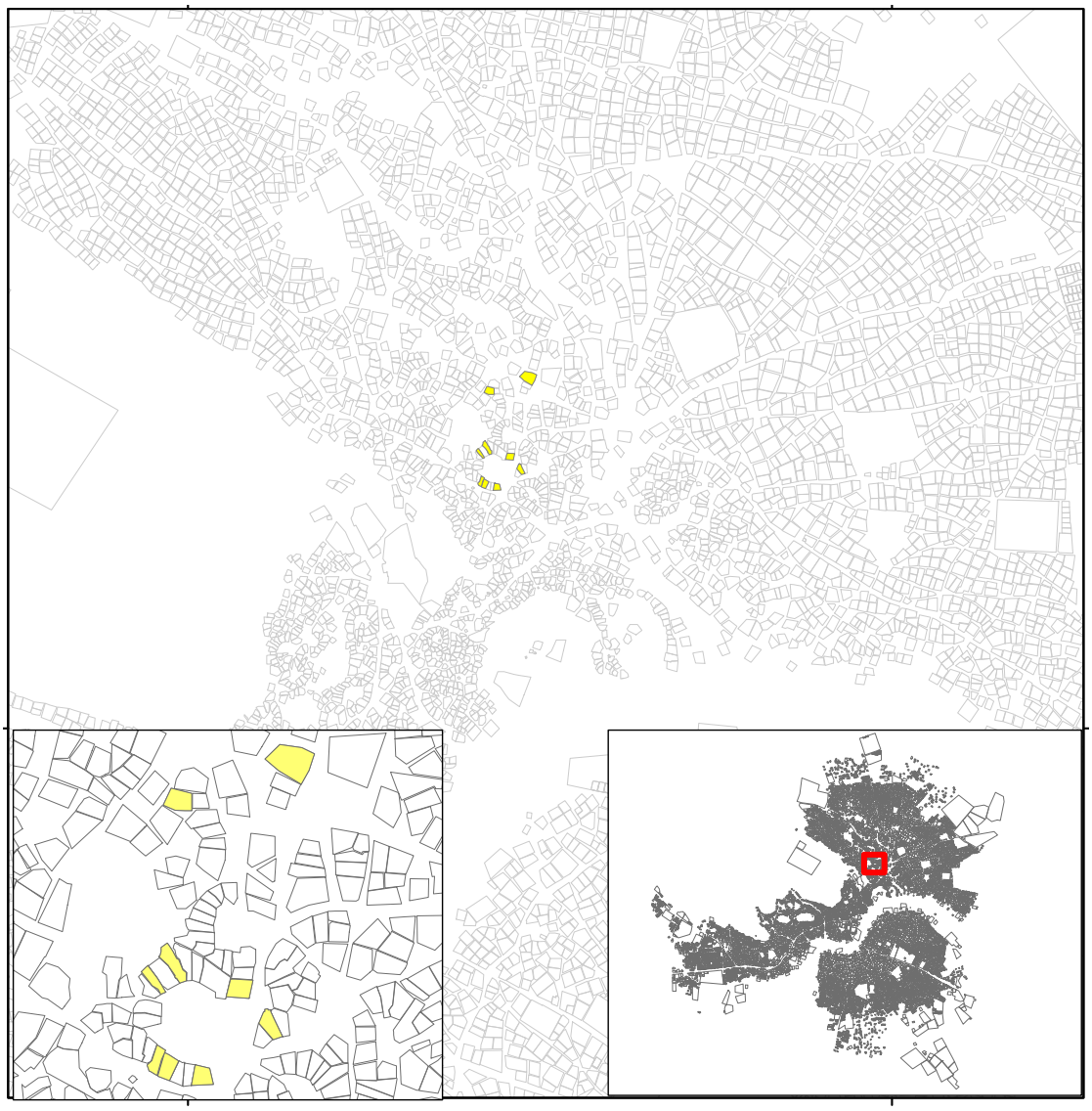


FIGURE 5.9: Tlagadi ward. *Source*: Superimposed by Author after maps from Department of Surveys & Mapping (2013).

(A) (B) (C)

FIGURE 5.10: Some of the houses selected for study from Tlagadi ward.

the occupants to remember). The remaining 34.4 % inherited land from their parents. The conclusion from this is that land is becoming increasingly expensive as it is not readily available.

TABLE 5.5: Cross-tabulation of land acquisition with the year of occupation. Many people in Mochudi were allocated tribal land before the 1980s, when land was readily available.

Date Occupied	**Land Acquisition**							
	Tribal Land		Inherited		Bought		**Total**	
	count	%	count	%	count	%	count	per
Before 1980	8	22.9	3	8.6	—	—	11	31.4
1980 – 1990	3	8.6	7	20.0	—	—	10	28.6
1991 – 2000	4	11.4	—	—	1	2.9	5	14.2
After 2000	1	2.9	—	—	1	2.9	2	5.8
Unknown	5	14.2	2	5.8	—	—	7	20.0
Total	21	60.0	12	34.4	2	5.8	35	100

TABLE 5.6: Cross-tabulation of gender literacy level with gender. A majority of the respondents have never attended school or gone as far as primary education.

No.of Occupants	**Occupancy**							
	Owner Occupied		Owner and Tenants		Tenants only		**Total**	
	Count	%	Count	%	Count	%	Count	%
1 – 5	12	34.3	1	2.8	1	2.8	14	40
6 – 10	15	42.9	—	—	—	—	15	42.9
11 – 20	6	17.1	—	—	—	—	6	17.1
Total	33	94.3	1	2.8	1	2.8	35	100

Table 5.6 indicates that 40 % of households had between 1 to 5 occupants, and 42.9 % had between 6 to 10 occupants while 17.1 % had between 11 to 20 occupants. 33 of the 35 households under study were owner occupied. The remaining two were occupied by tenants only.

This section presented a summary of the selected 'cases' in Mochudi. The following sections present the key observations and recordings from interviews collected over the three months period of fieldwork.

5.4 Social structure, social networks & family structure

This section aims to present the cultural values and social needs of the Bakgatla as recorded in the interviews. Their responses to the interview questions shows how their cultural values and social needs are reflected in housing. It is important to note however, that this is not a cause-effect analogy, but an attempt to understand physical transformations of housing, and how they relate to people's social behaviour. It is

important to note that even though Mochudi has undergone major transformations over the years, traditional customs and cultural values still carry strong symbolic presence, if not practical application amongst people.

Several researchers in Botswana (Grant, 1973; Larsson, 1996; Schapera, 1994) and from outside (Hamdi et al., 1995; Oliver, 2010; Rapoport, 1969b) have emphasised the importance of learning from cultural values and social needs, and integrating them into design and planning. In order to develop appropriate design strategies based on the context of Mochudi, it is important to first understand the cultural values and social needs of the end-users.

5.4.1 Meaning and understanding of dwelling

This section gives an account of the meaning of housing as given by the respondents and also observed by the researcher during the fieldwork study. Respondents were asked to define or express what housing means to them. After the first few interviews it was found that the best way to get people to talk about their understanding of what housing is, was to ask them to describe the kind of a house they would like to live in. It was an indirect way of getting the participant to express their views about their current houses, their social needs and aspirations. Figure 5.11 shows some of residents being interviewed.

(A) (B) (C)

FIGURE 5.11: Interviewing research participants in Mochudi.

Many of the interviewees talked about the the scarcity of land and how that makes building of houses expensive. They also expressed dissatisfaction at being allocated smaller plot sizes which do not allow them to hold social events such as weddings and funerals at home. For example, one of the respondents said:

> "I think we should change the way we build because we are given smaller plots. There is not enough land to be given bigger pieces of land as it was the case in the past".

Others referred to the aesthetics of houses as the most important to them:

> "Well, speaking as builder, I do like modern houses because I think traditional houses are not suited for our times".
>
> "... I always tell my clients that they can always extent their houses in future but they think it does not look good".

Many respondents said they are saving money to upgrade their houses either by adding new rooms, using new modern materials and also connecting services such as water and electricity:

> "Tiling, floor, ceiling, roof and stop nonsense ". (*'Stop nonsense' refers to a wall around a yard because it stops criminals from entering.*)
>
> "Connect power, kitchen, sitting room, ceiling, painting".
>
> "Extensions with 2 rooms, plaster, paint, and connect power".

These comments made by the residents are consistent with what the UN-Habitat recognizes as the right to adequate housing (Bredenoord et al., 2010; UN Habitat, 2009). As stated by UN Habitat (2009, p. 3), the right to "adequate housing must provide more than four walls ". In summary, the rights to adequate housing as stated by the UN Habitat (2009), and also expressed by the residents are:

- *Affordability:* Money is important in housing for buying land and the actual construction of a house. Unfortunately, unemployment is very high in Mochudi and many people are not paid enough to afford a decent house. These people do not have access to financial assistance from conventional financial institutions.
- *Participation:* Participants expressed the desire to be involved in housing-related decision-making at the national and community levels.
- *Habitability:* Many houses in Mochudi are not structurally safe or provide adequate protection against the harsh heat in Botswana. Many people commented on the need to extend their houses as they are crowded.
- *Cultural identity:* There were contradicting views amongst residents on the importance of culture in housing. Mochudi like other urban villages in Botswana has experienced significant economic and population growth due its proximity to the capital city, Gaborone. As a result this has led to challenges of maintaining their own identity due to external economic and political pressures.
- *Access to services and infrastructure:* Respondents expressed their dissatisfaction due to lack of connection to water, lack of access to sanitation facilities, and lack of access to energy for cooking and lighting.

5.4.2 Cultural identity, social needs and aspirations

It was observed that many traditional houses were demolished or obsolete and were replaced with modern houses, built of industrial materials. The research participants gave different reasons for replacing the traditional houses with modern houses. The main reasons were upgrading materials, services and adding space. For example they said:

> "... connect water to the kitchen, bath, toilets".
>
> "Build a house with roof tiles ... and with bath and the kitchen connected with water ...".
>
> "Add more space and rooms ... roofing with tile ...".

Others said traditional housing is a sign of poverty and of low status in a community:

> "... because people can say you are poor or look down on you ".
>
> "Traditional houses are not for modern lifestyle, it is a sign of poverty".
>
> "because traditional house is not healthy or safe because grass can fall anytime".

However, others expressed their preference for the comfort provided by the traditional houses in the summer period. However, they cited maintenance and durability of traditional materials as a challenge.

> "... modern house requires less repair and maintenance than a traditional house ...".
>
> "... mud and grass from Traditional houses are dirty and have to be maintained every year...".

It is evident from these statements that contemporary society wants to live in modern houses built of industrial materials. The young people interviewed stated that they want to live in houses that reflect their new economic status and modern tastes. The demolishing and replacing of traditional houses was driven and financed mainly by the young generation, mostly their children who found employment in urban cities.

The built environment in Botswana settlements and housing has changed over the last few decades (Larsson, 1996). However, the use of space and cultural practises have been re-appropriated to meet modern social and political structure. As a result, the essence of dwelling still carries the same symbolic value. For example, the outdoor space in the yard that was used predominately for gardening, keeping chickens, and for special events

such as weddings and funerals, is now being used for commerce. Figure 7.5 shows some commercial activities taking places in different households.

(A) There are many kiosks selling everyday goods.

(B) Keeping chicken for subsistence and selling.

(C) Selling firewood to earn a living is common in Mochudi.

FIGURE 5.12: Some of the outdoor spaces that have been turned into commercial spaces.

Some spaces have been modified from the traditional architecture to meet the new aesthetic demands of contemporary housing. For example, what used to be a *lolwapa* - a semi-public space shown in Figure 5.13a is now a veranda in modern houses, as in Figure 5.13b. The veranda still serves the same functions as that of *lolwapa*; receiving guests, talking and resting during the day amongst other purposes. As observed by Prussin (1974, p. 205), it is common in traditional architecture that the meaning and content of a space may vary, but the symbolic role remains the same.

(A) A traditional *lolwapa* used for receiving guests, cooking, relaxing and sleeping. *Source*: (Larsson and Larsson, 1983, p. 90).

(B) The modern veranda serves similar spatial and social purposes to the traditional *lolwapa* but it is of smaller scale. *Source*: Author.

FIGURE 5.13: Some spaces have been re-interpreted from the traditional architecture.

Unfortunately some of the outdoor spaces in the yard do not serve any function and are used for collecting garbage as illustrated in Figure 5.14.

Modern spaces are highly specialized and accommodate a specific function. For example, the bedrooms are primarily used for sleeping only. Unlike in the past, when the rooms were adaptable for other uses. This is no longer possible mainly due to the permanent furniture inside the house which makes it inconvenient to change the use (see Figure 5.15).

(A)

(B)

FIGURE 5.14: Left over spaces that are wasted.

FIGURE 5.15: People are able to afford modern furniture which brings a lot of convenience and comfort in their homes. However, it also makes spaces less adaptable.

This section has presented how spaces and physical forms have been transformed and appropriated by residents to meet their cultural values and beliefs.

5.4.3 Family structure and social networks

It is common in traditional communities for people with strong social links to live close to one another for social, economic and political support (Schapera, 1994). When asked about their relationship to their neighbours, how long they have known each other, and the whereabouts of other family members, the residents gave the following responses:

> "We relate well, visit, talk to each other, known them in 2000 when I started building".
>
> "There is peace in the ward, because people know each other".
>
> "We relate well, visit them, they are my relatives".
>
> "We relate well because we know each other, kids play well together, because the plots do not have boundary walls that separate people".
>
> "Relate well, visit them, they are my relatives".
>
> "We relate well with others, I have known them since I was young as I grew up here".
>
> "Yes we visit each other. They are my relatives. Since 1972 when I got married".

The research participants also emphasized the importance of helping each other, especially within their wards. This is particularly more important in self-help housing communities but it is less practised nowadays as people hire paid builders instead.

Other social activities such as visiting each other, talking, sharing food, and helping each other in funerals and weddings were mentioned as a way of building communal relationships. They mentioned the following as some of the benefits and supports they get from having a good relationship with their neighbours:

> "We have known since 1970, we help each other, visiting, chatting".
>
> "We cooperate very well with other residents as our plots share the same wall. We also share a *lesaka* (kraal) where the cows for weddings and funerals are kept".
>
> "We have known each other ever since we were given plots here we relate well, visit, ask for food, etc".
>
> "We have known them since 1999 - visiting, helping each other, funerals, weddings".

> "We visit, talk with with each other almost daily since they were allocated land here and a built house in 1987".
>
> "We practice *Agalesika* (Giving out money to bride and groom), *Mekogo* (helping the less privileged), vegetable (buying food in wedding) Mpepe (bartering) *Ditilo* (Buying chairs to other members) *Tsaadibolole* (*Badisa* or herdboys when wedding they buy a cow for their member when he is getting married), *Areshabisheng* (Farming), *Leotwana* (when a relative has passed away they help)".

The residents mentioned other numerous social activities that bring the community together. For example, the initiation graduation ceremony (known as *bogwera* (for men) and *bojale* (for women)) is organized by the tribe as part of their coming of age traditions (Setlhabi, 2014). Chapter 2 discussed the initiation customs which are common amongst the *Bakgatla* (Setlhabi, 2014). Initiation is a process that all young men and women that belong to the *Kgatla* tribe, are expected to go through in their process of growth (Setlhabi, 2014). As a result, they earn respect as adults who can be consulted on important affairs of the tribe or general community matters (Setlhabi, 2014). Even at the family level, there are discussions that are exclusively for the initiated only (Setlhabi, 2014). Another major event is the installation of a chief, which basically brings the whole village together. These are important social activities that occur at a community level.

5.5 Housing typologies and forms

This section identifies forms that emerged from changes and transformations of houses over time. The transformations of houses demonstrates the initiatives by the residents in attempting to improve the quality of their dwellings within their technical ability and socio-economic situations.

The description and classification of house types in this section is based on the visual or physical form. Following on the studies by Lawrence (1987), the house types are described in terms of process (self-help housing), construction materials and technology, form, aesthetics (appearance), spatial organization, space use, and affordability (costs). The following sections describe the house types observed during the field study using this criteria.

5.5.1 Self-help housing types

The focus of the fieldwork study was on houses that were built by owners or with the help of hired local builders. The formal housing which is mainly provided by the government or parastatal organizations and was not considered because it is limited or non-existent. The other major reason is the high construction costs of formal housing which are beyond the reach of the majority people. The other house types that were not considered are the traditional houses. They are visually non-existent. The few that still exist are left to ruin or used as storage.

There are mainly three self-help housing types that were observed. The following is a list of the house types that were recorded during the field study in 2013, from September to December:

- **Detached single-room:** This is the simplest and basic form of a housing found in families in low-income communities. It used to be the dominant house type but due to economic prosperity in Mochudi, only 23 % were recorded during the field study. It is a compact housing unit, built of a rectangular or square plan ranging from 10 m^2 to 15 m^2. Many of these house types have rooms added to them over time. It is a functional house with no aesthetic values. The space can be adapted for different uses but a lot of the activities takes place outdoors. A majority of people build this house as an upgrade from makeshift structures or traditional mud huts (see Figure 5.16). The intention is to improve on this type with a more spacious modern house when funds become available. This was also revealed by the respondents that they build this house type as a temporary solution while they save for a more permanent house such as two-and-half detached house type (the next typology to be discussed). However, even after building another house, the need for space means the detached single-room house continues to be used by children who have grown up or visitors. When these houses are no longer used for sleeping, they are converted into storage spaces or kitchens.

(A) Traditional houses are visually non-existent.

(B) A shack made of salvaged galvanized iron sheets.

(C) The basic form of a house built of concrete blocks.

FIGURE 5.16: A detached room is one of the common basic form of house residents build to move away from a makeshift shack or a traditional house.

- **Two-and-half detached house:** This typology is not only dominant in Mochudi but also in the rest of Botswana. There are many variations of this house type (see Figure 5.17). 57 % were recorded. This is a rectangular form with a veranda. There are usually two rooms with a bathroom and kitchen dividing the rooms. The room opens into the veranda. There are other variations with no veranda. In this case, rooms open to the outside.

(A) (B)

FIGURE 5.17: The dominant two-and-half detached house.

- ***Bungalow* or single-family house type:** This is the most complex of house types recorded during the fieldwork study. The house has many rooms with separate kitchen, lounge, bathroom and toilet. The rooms are divided into many compartments under the same roof and connected by a passage. Most of the individual spaces are highly specialized and not adaptable to other uses. Despite indoor kitchen and toilet facilities in these houses, there still exist outdoor kitchens and pit-latrines which are in use.

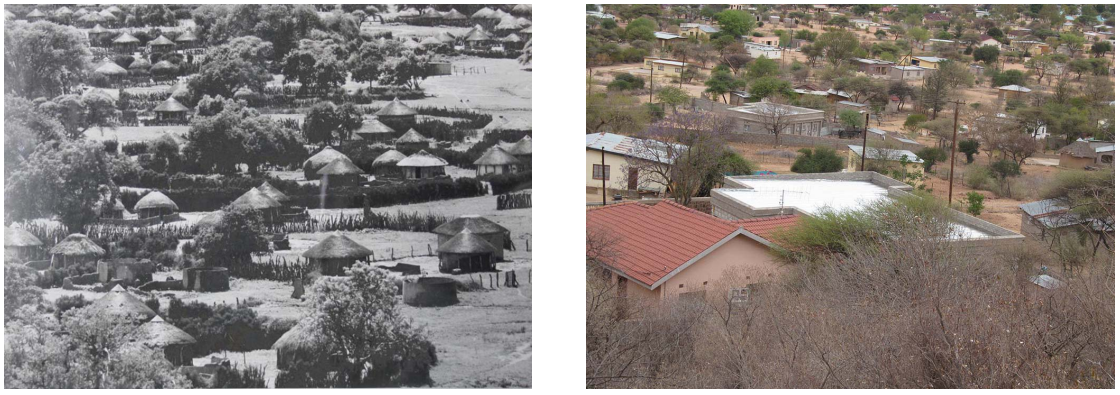
  The majority of the bungalow type of house owners are the *Bakgatla* who accumulated wealth working either in South African mines or in other cities in Botswana over many years (Larsson, 1996). Others were built by children who are working outside Mochudi and earning a decent income. Other respondents reported that they could afford to build this house type for their families in their home villages because they were provided with accommodation in their places of employment. As individuals that migrated to different places, they developed new 'taste' or a 'modern way' of life. They also became accustomed to living in houses of similar typologies from elsewhere, either rented or provided through their employment. Consequently, their houses reflect the influence of their experiences and interactions with other cultures. According to the interviewees, these type of houses are built to reflect wealth, 'progress' and 'civilization'.

(A) (B)

FIGURE 5.18: The bungalow types.

5.5.2 Form, aesthetics and image

Figure 5.19 are aerial views of the new forms of housing in Mochudi and typical traditional forms. There is an ongoing debate about the symbolic meaning and cultural identity of the new housing (Hamdi et al., 1995; Oliver, 2010; Rapoport, 1969b). However, this study does not discuss dwelling in historical or traditional terms; but housing that satisfies the users' needs within their social, economic and geographic context.



(A) Aerial view vernacular architecture in Serowe; a village in central Botswana. *Source*: (The National Archives, 1965b).

(B) The 'new' vernacular of concrete blocks; a continuation of the traditional principles? *Source*: Author.

FIGURE 5.19: Aerial views of traditional house forms and 'new' house forms.

Houses in Mochudi are dominantly single storey, built of simple forms as shown in Figure 5.19b. These are typical house types in low-income communities. The settlement (Mochudi) in Figure 5.19b is of low density; a continuation of the traditional principles as shown in Figure 5.19a. As discussed in Section 5.4.2, the meaning of space and use has changed over time, but the houses still serve the same social role. The major difference between Figure 5.19b and 5.19a is the use of technologically advanced materials.

5.5.3 Space use and organization

As already stated, another way of describing and classifying house types is the use of space. There are different household activities that were observed as shown in Figure 5.20. The figure shows typical activities that were observed such as cooking, laundry and entertaining of guests on the verandas. Residents pointed out that they spend a lot of time outdoors because the indoors are not thermally comfortable. In her studies of transformation of houses in Botswana, Larsson (1996) observed that there is a preoccupation in contemporary houses of creating compartmentalized indoor spaces. A similar observation was made during the fieldwork study in Mochudi. This provides more functional indoor spaces but not necessarily for dwelling as the spaces are thermally uncomfortable.

The research participants revealed that they spend their time in the morning either preparing for work or getting ready for school. The few that are employed or go to school stated that they wake up at 5am as they should be at school by 7am or at work by 7:30am. The majority of women stay home to look after children and also do household chores. They usually get to rest or sleep outside in the afternoon as it is too hot to do anything. At night, everyone is sleeping inside their rooms in the house. The participants expressed the desire to sleep outside as it is more comfortable, but for security reasons they cannot do so.

(A) (B)

FIGURE 5.20: A woman doing laundry while looking after children.

In the morning, meals are usually prepared indoors on a gas stove. However, the majority of people still cook outside using firewood (see Figure 5.21). The indoor kitchen is only used during bad weather conditions. The high costs of gas cooking hinders many people from cooking indoors using the gas stoves. After cooking, the residents eat their meals outdoors. There are no formalized places to eat, people take their meals wherever they feel comfortable.

(A) (B) (C)

FIGURE 5.21: Outdoor kitchens using firewood is common in Mochudi.

The other common use of space is for operating informal home-based businesses. The reason is that many people in Mochudi are unemployed and these businesses are their only source of income. Many of these home-based enterprises sell goods needed mostly for home consumption. Figure 5.22 are examples of the kiosks, also commonly referred to as *tuckshops*. These kiosks do not only serve an important economic purpose, but a social function as well. For example, people from the same ward are expected to buy from a *tuckshop* within their ward. It is known to bring conflict when a neighbour chooses to go and buy elsewhere. Women and children usually operate them because they spend most of the time at home. Women use it as source of income while they also look after children.

(A) (B) (C)

FIGURE 5.22: Kiosks are a popular home-based enterprises in many households in Mochudi.

There are other home-based enterprises such as selling of firewood, rearing chicken and goats. Figure 5.23 shows some of home-based enterprises that were recorded during the fieldwork study.

(A) Goats for selling and subsistence.

(B) Chicken for both selling and subsistence.

(C) Wood for selling and for home use.

FIGURE 5.23: Informal income-generating home-based enterprises.

5.5.4 Building materials and technology

The residents stated that they buy materials and save them for future building purposes. Figure 5.24 shows some of the building materials saved for future housing needs.

(A)

(B)

(C)

FIGURE 5.24: People in self-help housing communities buy and save materials for future use.

This section discusses the materials used for the different house types described in Section 5.5.1. These are materials used for building foundations, walls, roofs, windows and doors. It was observed that houses were mainly built of imported industrial materials. However, most of these materials are sourced from local building stores. When asked where they source their building materials, only a few of the research participants said they sourced their materials from outside of Mochudi. There are others who said they buy building materials produced locally in informal backyard factories (see Figure 5.25). Informal building products are in demand because they are affordable. However there were complaints on the quality of some of the products and the difficulty in addressing disputes because the businesses are not regulated.

The foundations are typically of steel and wire mesh reinforced concrete slab with concrete block footings. The dimensions of the footings and concrete slabs are determined by the house type and size. There are no formal calculations or extensive analysis to determine the dimensions of the footings and concrete slab for the different house structures. Usually, the builders rely on their experience and the rule of thumb to design

(A) Gates.

(B) Columns.

(C) Windows.

FIGURE 5.25: Informal business that sells cheaper gates, building columns and windows.

and size the foundations. It is for this reason that many structures are cracking because they are not built on a well designed and properly sized foundation. For example, the builders use the experience acquired from building traditional Tswana mud huts on shallow foundations, to make similar shallow foundations for the modern concrete houses (see Figure 5.26). Figure 5.26b is an example of a shallow foundation trench, approximately 200 mm to 500 mm. This foundation is not properly designed and sized to support the house structure and the loads on it. As a result, these houses are prone to cracks on the walls due to the ground movements and external loads.

(A) Foundation and walls cracking.

(B) Foundation for a Modern house.

(C) Foundation for a traditional house.

FIGURE 5.26: Houses are built on shallow concrete footings and slab to save materials.

Figure 5.27 are examples of houses in Mochudi built of concrete blocks or compressed and stabilized clay bricks walls. The use of mud is no longer allowed by building regulations but there was evidence of its application in older houses. The respondents informed us they choose to use industrial materials as they are durable and require less maintenance. They also cited mud as a backward material which does not reflect their current social status. Those with enough finance plaster and paint their walls or use compressed and fired bricks (see Figure 5.27a). Others are never plastered or half-plastered as illustrated in Figure 5.27c. The walls are uninsulated and built of a single solid layer of not more than 230 mm in thickness.

Roof materials commonly used are corrugated zinc galvanized metal sheets, slate tiles, concrete or clay tiles (see Figure 5.28). The choice is primarily driven by affordability

(A) Compressed and fired bricks.

(B) Mud wall rendered with cement render.

(C) It is common for walls not to be plastered.

FIGURE 5.27: Concrete blocks or compressed stabilized clay brick are used for walls.

and social status (aesthetics). Corrugated zinc sheets are the most commonly used as they are the cheapest. 83 % of the surveyed houses were roofed with corrugated zinc metal sheets, while 14 % were roofed with concrete tiles. The remaining 3 % were thatch roofs. From the experience of working on residential projects in the city and also from the accounts given by the interviewees, the roof is the most complex and expensive part of the house construction. It is for this reason that many people compromise on the quality of roofing to reduce the costs. For example, there is no insulation provided for the roofs which leads to excessively hot interior temperatures in the summer and extremely cold in the winter. Reducing the costs also means the roofs barely cover the walls without adequate eaves. This exposes the windows and the walls to the maximum solar radiation.

(A) Corrugate metal roof.

(B) Concrete roof tiles.

(C) Thatch roof.

FIGURE 5.28: Corrugated zinc galvanized metal sheets, slate tiles, concrete or clay tiles.

The windows and doors are usually bought from the local hardware store. There are many informal business along the road in Gaborone who sell cheaper windows and doors (see Figure 5.25). The windows are single pane glass and provide no thermal protection. They remain closed almost all the time for security reasons. The location of windows is not planned according to solar radiation. As already mentioned, the windows are also exposed to solar radiation due to lack of cover from the roof overhang.

Beyond the functional purposes, the other reasons for upgrading windows and doors is for social status and for security purposes as illustrated in Figure 5.29. The windows and

doors are important architectural elements on the building facade, which means people invest more on them to reflect their social status or aesthetic values. Figure 5.29c shows the iron burglar proof bars behind windows that are not only functional but also decorative.

(A) Decorated entrance.

(B) Security and functional.

(C) Aesthetics and security.

FIGURE 5.29: Windows and doors are important architectural elements on the building facade.

5.5.5 Construction costs and resources

Affordability is an important factor in deciding the type of house to build and the quality of materials to be used. This was reported by the residents when they cited the high cost of land and building materials as a major obstacle to building a decent house. It is for this reason that they prefer to buy from the informal building material industries as they are affordable. These factories are set-up in residents' backyards or in unoccupied public open spaces. Most of these businesses operate illegally but are very popular amongst the self-help clients. Many people buy from these informal businesses regardless of the quality of the products and the lack of a guarantee. These businesses offer flexible payment terms and personal services unlike formal local stores. Also, the majority of the owners are local people who are well known in the community. The local builders who are responsible for most of the self-help housing, are also well connected to these informal factories and can negotiate better prizes for their clients. However, some builders collude with the suppliers to cheat the clients.

The following are some of the accounts given by the respondents when asked about their views on housing construction cost:

> HOUSE OWNER: "Everything is expensive nowadays . . . ".
>
> HOUSE OWNER: ". . . nowadays materials are expensive, even the traditional houses are expensive".
>
> FOCUS GROUP PARTICIPANT: "I would like a very expensive and big house but I will never be able to afford one. I am still renting and land

is very expensive in Mochudi. The government should provide land for the youth as it is difficult for them to find land".

SURVEY PARTICIPANT: "There is a housing problem mainly in the rural areas where inhabitable structures are quite dominant. Indicative of the widespread poverty".

As already noted, self-help houses are mostly self-funded as illustrated in Table 5.7. However, some were subsidized by the government or by other public institutions. It is evident from the table that the respondents (67 %), rely on their personal savings to finance housing. These savings are mainly from informal businesses, farming and salaries. The table shows that 43 % of the respondents used savings from farming which is a significant number. Only 11 % of the respondents received financial assistance from commercial banks.

TABLE 5.7: Sources of funding and employment status.

Sources of Funding	**Employment Status**				
	Employed	Self-employed	Unemployed	Retired	**Total**
Salary	5	5	0	1	**8**
Savings	1	10	11	1	**23**
Family Contributions	0	5	5	0	**10**
Farming	1	6	7	1	**15**
Government Funding	0	2	2	1	**5**
Commercial Banks	0	3	1	0	**4**
Informal Banking	1	3	1	0	**5**

The government's expenditure on housing is minimal. The government's expectation is for people to meet their own housing needs using their own resources. Since the majority of people rely on informal resources to finance their housing needs, it is only possible through an incremental building process over a period of time. Incremental housing can be achieved through a flexible housing approach.

5.6 Conclusions

This chapter presented an overview of the social structure, political order and spatial organization and physical form of the houses that were investigated in Mochudi. It sets out by providing a general description of the demographics data of the research

participants and a detailed description of the selected wards and households selected for the study in Mochudi. The chapter concludes by giving an overview the physical forms and spatial organizations of the households under study; and how that relates to cultural values, aspirations and social needs. These are important in understanding dwelling in the context of Mochudi; and forms the basis of developing an appropriate design strategy for housing in Botswana's economic and political context.

The study revealed that even though Mochudi has undergone major social and physical transformations, the houses still reflect the traditional social structures, beliefs and cultural values. The examination and analysis of the transformation of houses led to a deeper understanding of the design and construction processes. The major discovery from the fieldwork study is that residents are engaged in incremental housing processes as a way to improve the quality of their housing using the resources available to them. The challenge is that this is not planned and managed. To address these shortcomings, a second fieldwork was conducted to collaboratively explore and introduce appropriate design interventions that would improve the quality of self-help housing in Botswana.

Chapter 6

Participatory action research - Focus group

6.1 Introduction

The proposition of this study is that flexible housing strategies are an effective and responsive approach for the continuously changing cultural values and social needs in self-help housing communities in Botswana. This chapter examines the prospects of using a flexible housing strategy to improve the quality of self-help housing. This is examined through participatory action research (PAR), using a focus group consisting of local builders and residents in Mochudi. The chapter begins by briefly introducing the concept of participatory action research as conducted through focus groups in Mochudi. It is followed by sections exploring and assessing design methods that empower participants to take an active role in the decision-making processes of the design and construction of their houses. These methods are collaboratively explored with focus groups in scenario workshops. The section concludes by capturing people's views on participation processes in current and future housing design and construction developments. This chapter concludes by introducing the concepts of flexible housing strategies to the participants.

6.2 Participatory design in housing

This section introduces how PAR was conducted in Mochudi. The hypothesis of this study is that a participatory approach through a flexible housing strategy is cost-effective and socially appropriate method that empowers end-users and local builders to improve

the quality of their housing. This part of the research adopted the use of a focus group in facilitated scenario workshops. Since this was an exploration of a possible use of flexible housing strategies for self-help housing in Botswana, a scenario workshop was found to be an appropriate.

A series of activities were conducted to engage the research participants and to explore design strategies that would improve the quality of self-help housing. Participants were also given an opportunity to express their views and opinions on the use of the proposed design strategies. They also gave their opinions on how it could be improved. These activities are presented in the following sections.

6.2.1 Scenario workshops

A scenario workshop through a focus group provided a platform to share ideas about housing with a group of local builders and ordinary users (see Figure 6.1). Scenario workshops were conducted over a period of two-days to introduce the concepts of flexible housing for self-help housing to the research participants (see Figure 6.2).

The composition of the workshop participants is very important for a participatory and interdisciplinary approach to research (Krueger, 1997b). The composition and demographics of the workshop participants such as age, sex and education level are presented in Section 6.2.3 and 6.2.4. The interests and the agenda of the research participants was varied as the group was composed of young and old, employed and unemployed, and home owners and tenants.

(A) Using drawings (B) Using wooden blocks (C) Flexible housing concept

FIGURE 6.1: Focus groups participating in workshop activities.

Another important aspect of conducting a focus group in a community centre in Mochudi is that it allows participants to express their ideas in a familiar environment. According to literature, it is important that scenario workshops are conducted in a 'real' context (Kitzinger, 1995; Morgan, 1997). This allows participants to express their attitudes, social values, economic situations and political structure affecting decision-making without being intimidated (Kitzinger, 1995; Morgan, 1997). In addition to conducting the

scenario workshops in a community setting, a local language was used. The research participants from the first workshop were solicited through a community leader and a local builder known to the researcher from a previous design and build project in 2011 in Mochudi. The project was a collaboration between students from the University of Botswana and Dalhousie University, Canada. The project was for Bakgatla Bolokang Matshelo (BBM) Aids Hospice; a non-profit community organization based in Mochudi. The second group participants were solicited through the same community leader but their workshop was at a church venue. The church is used as a place people come to for social gatherings and counselling on their personal matters. Therefore, the focus groups were composed of people with on-going social relationships which is important for PAR (Kitzinger, 1995; Morgan, 1997). The community leader and the builder introduced the research project to the participants, giving the participants a sense of ownership of the research project. However caution was taken not to end up with a group of local 'activists', as advised by Street (1997, p. 147).

(A) (B)

FIGURE 6.2: Researcher presenting the objectives of the study to the research participants.

After the introductions, a brief background of the previous case study research conducted in 2013 in Mochudi was given. Following the background introductions, the aims of the current research were presented (see Figure 6.2). The ultimate aim was introduced to the research participants which was to explore and also encourage them to adopt 'progressive' design strategies that have been successful in other countries. A number of scenarios and themes from previous research was introduced as inspiration to develop possible design strategies during the workshops. The following section outlines the scenarios and research themes that were introduced to the focus groups.

6.2.2 Scenarios and theoretical constructs

The purpose of the scenario activities and the theoretical constructs (presented in Section 4.7 in Chapter 4), were to guide the discussions between the researchers and the participants. It was also meant to guide the explorations to the possible use of a flexible housing strategy in collaboration with the research participants. This section presents the scenarios and themes from the workshops:

1. *Scenario I: Understanding the meanings, values and aspirations on housing:* Participants were asked to describe what they understand about housing challenges in Mochudi, and what could be done to address them. This was not the ultimate goal of the workshop, but it was important to know the participants' expectations and perceptions towards housing. As the focus was on design strategies, workshop activities and questions were aimed towards design methods and tools. A strategy that was used to focus the discussions on design and clarify the intention of the workshop, was to show participants pictures of houses and ask them what they like about them. This enabled the discussions to move towards architectural form and design space, aesthetics and building materials. The recordings from this scenario workshop are in Appendix E.

2. *Scenario II: exploring design strategies currently used by the residents and the local builders:* The participants were given markers and papers to draw an ideal house for themselves according to their views and aspirations.

3. *Scenario III: engaging the users and the local builders in developing an alternative design framework or processes:* This scenario is similar to scenario II, but instead of using markers and papers to draw, the participants were using wooden blocks provided by the researcher.

4. *Scenario IV: introducing the concepts of a flexible housing:* The flexible housing strategies were introduced at the end of the workshop with the expectations that it will be adopted as an alternative method to the current approach.

In addition to the workshop scenarios, participants were asked to individually list, rank and choose items on the questionnaires provided by the researcher. The items were influenced by the case studies and literature review. Several themes emerged from the scenario workshops and from the individual items that were listed and ranked in the questionnaires. As stated in the methodology chapter, this research follows inductive-deductive logic. The theoretical constructs from these scenarios, are developed and presented in Chapter 7. The following Sections 6.2.3, 6.2.4 and 6.2.5, presents the architectural forms and spaces developed by using these scenarios.

6.2.3 Focus group I

The first focus group workshop was conducted at Bakgatla Bolokang Matshelo (BBM) in Mochudi (see Figure 6.3). BBM is also used as a community venue for hosting meetings and training events. As already stated, the participants in this group were recruited through a local builder. The participants were local builders, house owners and tenants; all residing in Mochudi. There were twelve participants. There were eight females and four males. The females' age range was between 50 and 75 years, with the exception of one aged 29 years old. The males were aged between 35 and 39 years old, with only one aged between 40 and 49 years old. The majority of the participants in this focus group were unemployed. A few were either working or volunteering for BBM. Table 6.1 list the age, gender, occupation/role and tenancy status of the participants.

TABLE 6.1: A list of Focus Group I participants showing their age, gender, occupation/role and tenancy status.

Participant Code	**Gender**	**Age**	**Role/occupation**	**Tenancy**
FGI-01	Male	30-39	Finance officer	Own
FGI-02	Female	60-69	Administrator	Own
FGI-03	Female	60-69	Unemployed	Own
FGI-04	Female	50-59	Counsellor	Own
FGI-05	Female	50-59	Unemployed	Own
FGI-06	Female	20-29	Unemployed	Rent
FGI-07	Female	70-79	Unemployed	Own
FGI-08	Female	40-49	Administrator	Rent
FGI-09	Female	50-59	Volunteer	Own
FGI-10	Male	30-39	Finance officer	Own
FGI-11	Male	30-39	Builder	Own
FGI-12	Male	40-49	Builder	Own

The first focus group was involved in scenario I, II and IV. Scenario IV, which is key to this study, is discussed in Section 6.3. Only key responses and observations that highlight the themes and concepts that emerged from this group are discussed in this section. Detailed notes and observations as recorded during the workshop are given in the appendices.

1. *Scenario I: Understanding the meanings, values and aspirations on housing:* During this scenario participants were critical of what they viewed as outdated housing policies and shortage of land due to poor management. The issue of affordability was brought up frequently but it was in relation to policies and land shortages. Many participants stated that they aspire to live in better houses built of modern materials. However, they pointed out challenges such as the lack of finance, poor

FIGURE 6.3: Focus group I participants.

land management and outdated housing policies as major obstacles. Appendix E are comments and observations recorded for scenario I workshop.

Figure 6.4 is a diagrammatic representation of a relationship between the design strategies developed by incorporating the views and aspirations of the participants.

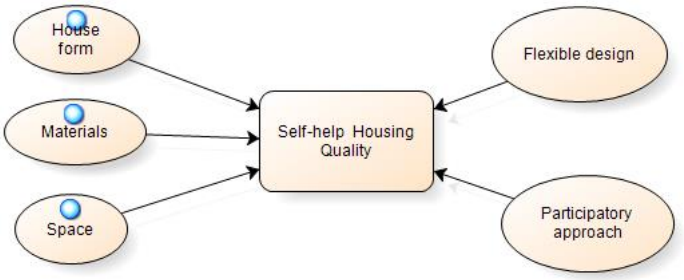


FIGURE 6.4: A model developed in NVivo as a diagrammatic representation of incorporating the cultural values and social needs of self-help housing through a participatory and flexible housing approaches.

The blues circles in Figure 6.4 are nodes coded in NVivo. They indicates comments on house form, spatial organization and building materials as stated by the participants. As already stated, all the comments from scenario I are in Appendix E with only a few given in the following:

> "Whether the house is traditional or modern, for me it does not matter. The most important thing is for me to be happy and be able to provide for my family".

> "I want a house that I do not have to go outside for anything. I want all rooms to be accessible from inside so that I am not seen by people when I am home with my family. I also want to be protected against criminals".

> "I would like to live in a house that will be beautiful, designed by an 'architect' as they make nice houses. It should have lots of glass as I think that is beautiful".
> *A comment by the youngest person in the room.*

> "I do like houses that are seen in Phakalane, I would like to live in one of those houses as I grew up poor living in houses of poor quality".
> *Phakalane is a suburban place for the most affluent people in Botswana. It is located a few kilometres from Gaborone.*

As stressed so far, housing finance is beyond the scope of this work. However, it is important to point out that many participants raised the issue of affordability and lack of financing as the main obstacle to adequate and quality housing. For example, some participants stated that:

> "The government should be doing a lot more for poor people like myself. We cannot afford to buy land, let alone think about building a house".

> "I would like a very expensive and big house but I will never be able to afford one. I am still renting and land is very expensive in Mochudi. The government should provide land for the youth as it is difficult for them to find land".

Others cited poor land management as the main reason why they cannot afford to build decent houses:

> "The government has to make land available to the youth because they cannot afford to buy land and build at the same time. If land is made available, maybe that will encourage more people to build their own homes rather than spend the rest of their lives renting".

> "I think we should change the way we build because we are given smaller plots. There is not enough land to be given bigger pieces of land as it was the case in the past. I think we should build double stories like people in developed countries".

> "Land should be made available and financed by the government".

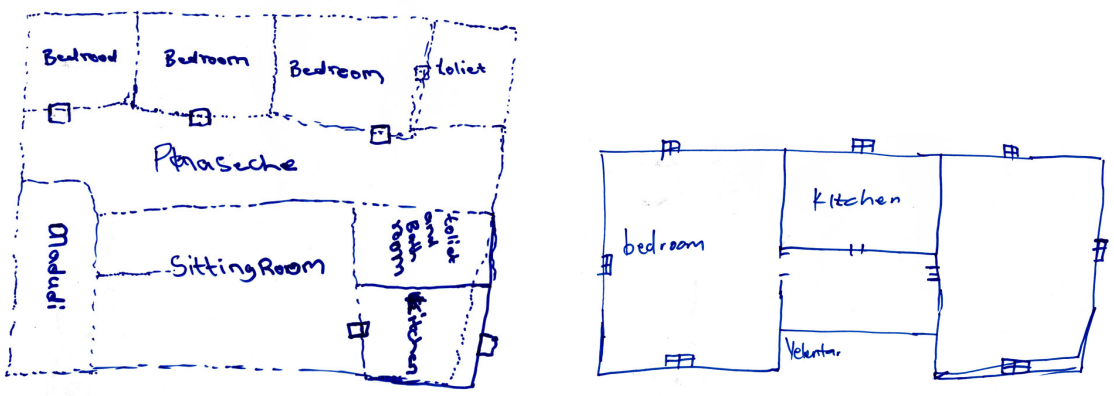
As already stated, the key comments from the research captures views and aspirations on house form, aesthetics and spatial organization. Scenario II which is explained below, is the beginning of the exploration of house form and spatial organization through drawing.

2. *Scenario II: Exploring design strategies currently used by the residents and the local builders:* In the first day, participants were given drawing materials (papers and markers), to draw what they consider to be an ideal house to them (see Figure 6.5). The plans were then discussed and common themes identified. No examples were given to the participants so as not to allow previous experience and knowledge to influence them. The aim was to identify architectural forms and design space that people use to express their social values and cultural identity. Unfortunately, there was no time to develop the ideas beyond the initial stage.

(A) (B)

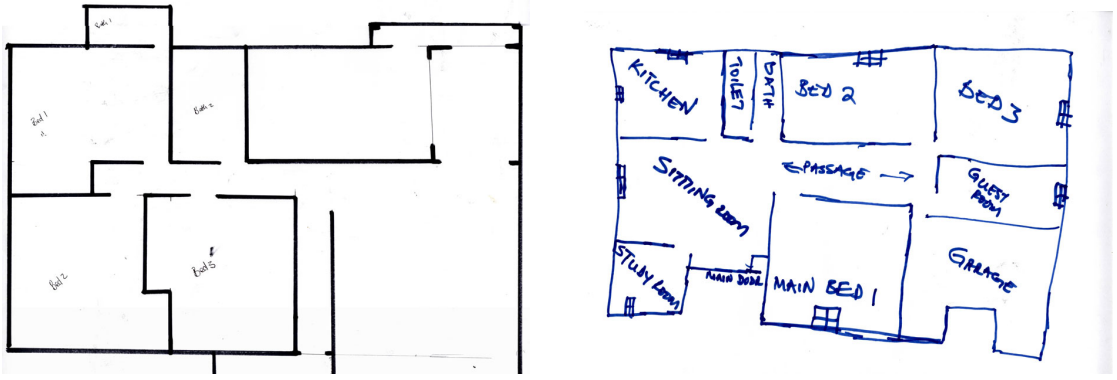
FIGURE 6.5: Focus group I workshop session. Participants were given drawing materials (papers and markers), to draw a house according to their own values and aspirations.

Figure 6.6 and 6.7 are examples of some of the drawings that were created by the participants. Studying the drawings from this workshop, it was observed that they were influenced by the existing typologies in Mochudi. For example, a verandah was a common feature in the drawings as it is also the case with existing built houses observed during the fieldwork. A passage connecting the internal rooms is also a common feature as a transitional space. The desire to have internal spaces opening into a passage or a verandah was expressed by participants during the first fieldwork.



(A) (B)

FIGURE 6.6: Drawings of houses created by the participants in the first workshop. Outdoor covered verandahs and passages connecting internal spaces are common features expressed in these drawings.



(A) (B)

FIGURE 6.7: More drawings created by the participants.

6.2.4 Focus group II

The second workshop was conducted two days after the first workshop. The venue for this one was at a church where people come for social gatherings and counselling. The church also serves as a meeting place for members of the community. The majority of the participants were either unemployed, employed in low-paying jobs or engaged in informal employment. There were seven men aged between 30 and 70 years. There were four females aged between 20 and 30 years old with an exception of one aged above 60 years old. In this group, five participants had completed tertiary education with the rest having completed only up to high school level. Table 6.2 list the age, gender, occupation/role and tenancy status of the participants. Figure 6.8 shows some of the participants.

Figure 6.9 are examples of some of the housing typologies that were created by the

TABLE 6.2: A list of Focus Group II participants showing their age, gender, occupation/role and tenancy status.

Participant Code	Gender	Age	Role/occupation	Tenancy
FGII-01	Male	60-69	Pastor	Rent
FGII-02	Male	40-49	Road technician	Rent
FGII-03	Male	50-59	Security officer	Rent
FGII-04	Male	30-39	Salesman	Rent
FGII-05	Female	20-29	Shop assistant	Rent
FGII-06	Female	60-69	Cleaner	Rent
FGII-07	Female	20-29	Unemployed	Rent
FGII-08	Male	30-39	Self-employed	Own
FGII-09	Male	40-49	Unemployed	Rent
FGII-10	Female	20-29	Student	Rent
FGII-11	Female	20-29	Unemployed	Rent
FGII-12	Male	40-49	Informal mechanic	Own

(A) (B)

FIGURE 6.8: Focus group II participants.

participants. The blocks allowed the research participants to develop new housing typologies not common in Mochudi.

Focus group II was involved in scenario I, III and IV. Scenario IV is discussed in Section 6.3. Only a summary of the key responses and observations highlighting the the research themes are given in this section. Appendix E presents all the comments and observations recorded for scenario I.

1. *Scenario I: Understanding the meanings, values and aspirations on housing:*

   Focus group II gave an account of how housing policies, lack of finance and land shortages have proven to be the major reasons why they cannot build decent houses. Similar to the first focus group, the study focused on the comments and

(A) (B)

FIGURE 6.9: Housing typologies created by the participants in the second workshop. New typologies were created that do not exist in Mochudi.

observations about the form, space and aesthetics of houses. Some of the key issues that surfaced during this scenario are:

> "I have lived in a traditional house before and they are dirty and not safe at all. They also require a lot of cleaning and maintenance".
>
> "Ever since I came here I have been renting and do not have any prospects of owning a house considering my financial situation. However, if I had money, I will like to live in a very spacious modern house".
>
> "If I had money I will build a nice big house in Gaborone for rental purposes. I will use that money to build a small house in Mochudi for my family".

This is only a brief overview of scenario I as conducted for the second focus group. It followed the same procedure as the first focus group. The rest of the comments and discussions are given in Appendix E. After discussing the meaning and understanding of housing in scenario I, scenario III was introduced. The following describes the activities, observations and comments for scenario III:

2. *Scenario III: engaging the end-users and the local builders in developing an alternative design framework or processes:* For the second focus group, participants were given wooden blocks of different shapes to use as part of the design activities in this scenario (see Figure 6.10). The blocks are abstract forms that allows participants to focus on house form and space, rather than the image and style of a house. The purpose was to observe participants' cognitive ability when developing house forms and spaces. In contrast to the first focus group, the participants were limited to explore forms and spaces within the limits of the

provided blocks. Consequently, the explorations were influenced to a certain extend by the researcher's architectural understanding and values in design. The participants' actions, views expressed and expectations are recorded in Appendix F.

(A) (B)

FIGURE 6.10: Participants were given wooden blocks to express the houses they would like to build.

6.2.5 Listing and ranking activities

Focus group I & II participants were involved in various activities to measure their perceptions and attitudes towards self-help housing in Botswana. These involved ranking, scoring and listing activities using a 5-Point Likert-scale (Wakita et al., 2012). Each individual participant was provided with a questionnaire to score, list, and rank according to how strongly they agree or disagree with a particular topic. The following tables present the responses reflecting the attitudes and opinions as expressed by participants from the various statements that were designed in the questionnaire:

1. *Housing challenges in Botswana:* After scenario I activities, participants were given questionnaires to express their opinions on what could be causing housing challenges in Botswana. The statements consisted of several statements that were developed by the researcher based on the previous case study research and literature. The participants were to indicate if they agree or disagree with the statements based on the 5-Point Likert-scale (Wakita et al., 2012). Table 6.3 reflects the responses and the statements from the workshops. The colours represent the intensity of the agreement and the number of respondents on a particular topic. It is important to note that even though the darkness of the colour reflects the number of respondents on a particular statement, the analysis are still qualitative.

2. *House form, aesthetics and image:* Participants were given four images of different types of houses to choose based on a 5-Point Likert-scale. There were several

factors to choose from such as the house form, space, aesthetics, materials and affordability. The houses were selected based on findings from case study research presented in the previous chapter. Table 6.4 shows the houses that were chosen and comments based on the factors that were under considerations.

3. *Design tools and methods:* Several options were given to the participants and they were asked to choose the ones they use currently. Table 6.6 is an illustration of the tools and methods that are used by the participants.

4. *Roles and responsibilities:* Participants were asked to score and rank what they think are the roles and responsibilities of architects and builders in housing projects. Table 6.7 is a reflection of the outcome based on the scoring and ranking by the participants.

5. *Improving the design and construction delivery of housing:* Participants were asked to choose and rank factors that they think are important and can address the housing situation in Botswana. Table 6.8 show what the participants suggested as important steps to improve the quality and the delivery of affordable self-help housing.

TABLE 6.3: Ranking and listing of factors in housing that the participants viewed as important to address housing challenges.

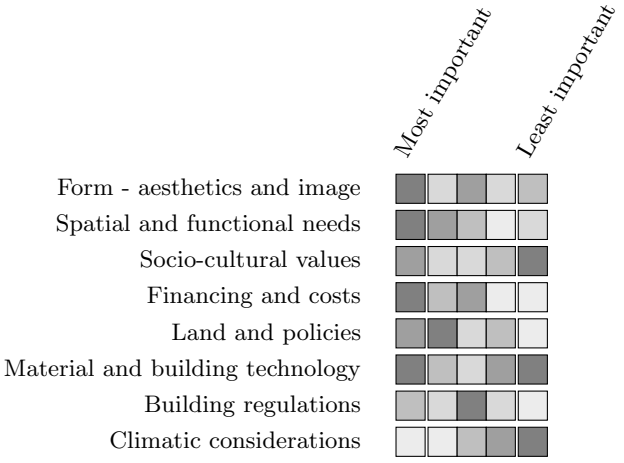


TABLE 6.4: Participants were given four images of different types of houses to choose and comment on why they choose one over the other.

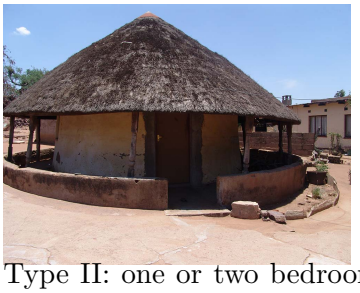
House Types	**Comments by participants**
Type I: A traditional house 	*Affordability* "The money that I have I can only afford to rent a Type 1, not even owning it". *Social and spatial needs* "I grew up in traditional houses and the last thing I want is to live in one. I came here to work and get a better life and living in a traditional house is backwardness".
Type II: one or two bedroom house 	*Affordability* "I think realistically in my lifetime I can only afford a Type II, and also that is after many years of savings". "Type II is what I can afford for my family but not really the house that I like". *Social and spatial needs* "For me a modest house such as Type II is fine. I do not need a big house because I am old and not concerned about what people thinks or say about my house".
Type III: three bedroom house with facilities 	*Affordability* "My dream is to at least build a Type 3 even though I like Type 4, but it is for the rich people who have a lot of money". "At the moment I think it is only possible to build myself a Type 3, that is if I get a better job". *Social and spatial needs* "At the moment I own a Type 2 and hopefully after some years I will upgrade to Type 3". "Type 3 will be nice for me and my family".
Type IV: double storey houses 	*Affordability* "I also hope that my children will build a Type IV for me if they get a good job". "I like Type IV but I know very well that I cannot afford it". "Type IV obviously is what most people would like but they cannot afford it". "Type IV is for the rich, there is no way that I can ever live in such a house". "I will like to live in a mansion of course but that can only happen after winning a lottery ". *Social and spatial needs* "Type 4 because it is beautiful and it shows that I am rich".

Table 6.6: Ranking and listing of the current design tools used by the research participants. They were asked to choose an rank the methods and tools they use for their housing.

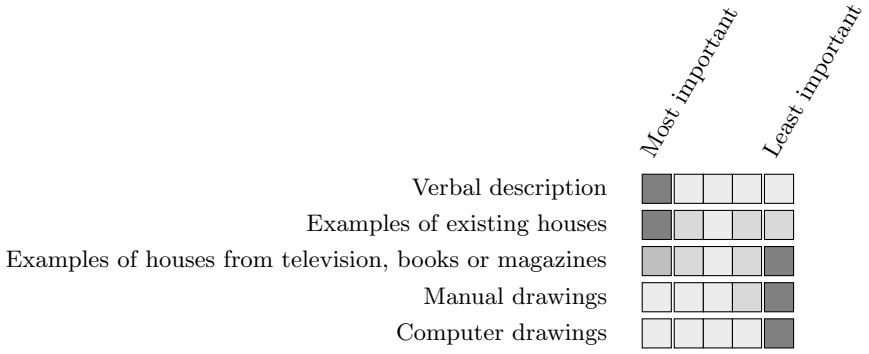


Table 6.7: Ranking and listing of the roles and responsibility of architects and builders in self-help housing.

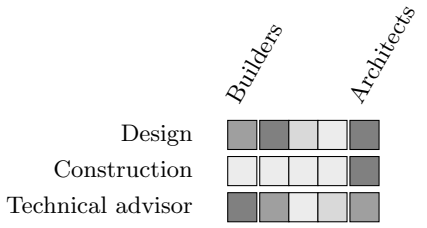
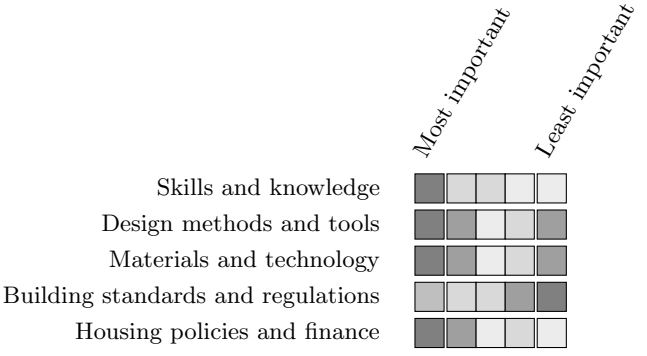


Table 6.8: Ranking and listing of the factors that can improve the delivery of self-help housing by the participants. They were asked to choose and rank the factors according to their importance.



6.3 Flexible housing strategy

The aim of the scenario workshops was to introduce flexible housing concepts to the local residents and local builders who currently rely on 'informal' design processes. Design is considered a foreign or unimportant concept in Mochudi. Flexible housing strategies are proposed to enable the participation and empowerment of end-users and local builders to improve the quality of self-help housing. This decision is informed by the case study research presented in the previous chapter. It was observed during the case study research that residents are already engaged in 'informal' transformations of their dwellings. However, these transformations were not planned and uncoordinated which resulted in the quality of the dwellings being compromised. A hypothesis was developed that a flexible housing strategy is socially appropriate and economically viable method to improve the quality of self-help housing. Therefore, the aim of this scenario workshop was to study the social and economic impact of adopting a flexible housing strategy for self-help housing in Botswana. This was to be achieved through a participatory approach in a focus group. The objective of the focus group was to identify challenges that might prevent people from adopting flexible housing design to meet their housing needs.

Section 6.2.2 briefly introduced Scenario IV. To introduce the flexible housing concepts and help focus the discussions, pictures of flexible and incremental housing projects from around the world were shown to the participants. Pictures did not only help clarify the concepts but also helped to focus the discussions on the aims of the workshops. The pictures were chosen based on social, economic and political impact rather than on the design or technical application of the projects. The development and technicalities of implementing a flexible housing strategy are beyond the scope of this work. This scenario workshop was only meant to introduce the flexible housing concept and to qualitatively assess the social and economic impact of adopting this strategy for self-help housing.

Another important aspect of the workshop was the rating, scoring and listing of important factors in housing. The aim was not to prioritise any ideas but to gain an understanding of what participants think about importance of improving the quality of housing through design.

6.3.1 Introductions of flexible housing strategies

At the beginning of this scenario, three flexible housing projects were introduced to the participants (see Table 6.9). The participants were local residents and local builders with no previous or formal knowledge of flexible housing. Project examples were carefully

selected to highlight housing challenges in Botswana, and their practical relevance to exploring a flexible housing strategy for self-help housing. As already mentioned, the emphasis was on the social and economic impact of adopting this approach for self-help housing in Botswana's context. Table 6.9 is a list of projects that highlight the importance of an effective and responsive design approach for the continuously changing cultural values and social needs in self-help housing.

In general, the projects in Table 6.9, reflect the following socio-economic and political values of adopting flexible housing strategies for self-help housing:

- Incremental development by minimizing initial costs and maximize potential growth,
- Housing that reflects social and cultural values, rooted to a specific place/context,
- Affordability - reducing life-cycle costs,
- Use of local materials and construction methods, and
- User-participation and empowerment in design and construction process.

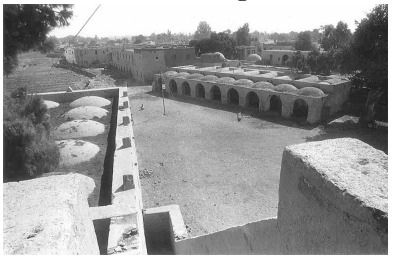
These values are adopted from Kendall and Teicher (2010) and Hamdi (2010; 1995). These principles and values are also found in traditional Tswana architecture and some of the houses studied in Mochudi.

Figure 6.11 shows participants looking at the pictures of the projects that were presented. It was easier for participants to understand and appreciate flexible housing strategies from looking at pictures. It was never the intention of this workshop to discuss the technical aspects of flexible housing with the participants. As expected, the discussions were typically on the economic and social issues about housing in Botswana.

(A) (B) (C)

FIGURE 6.11: Introduction of pictures of flexible housing projects to the participants.

TABLE 6.9: Flexible design projects shown to the participants as part of introducing the 'new'concepts.

Projects	Description
Quinta Monroy social housing project 	*Iquique, Chile* A project developed with the participation of residents. "Our strategy was to transmit the idea that the building was a diversity organizer and therefore should not incorporate the character of the individual additions but maintain some homogeneity " (Aravena and Iacobelli, 2012, p. 129). **Flexible housing strategies:** User-participation and empowerment, incremental building, affordability, modularity, social and cultural values.
New Gourna Village 	*New Gourna, Egypt* This project "...was an experiment in a community-orientated process of building as well as an aesthetic investigation by the architect" (Richards et al., 1985, p. 91). The idea was to build a new village by taking advantage of the flexibility of mud architecture (Richards et al., 1985, p. 87). **Flexible housing strategies:** Use of local materials and construction methods, social and cultural values, affordability, modularity
Housing Association of Papendrecht 	*Molenvliet, Netherlands* The project "...consists of a highly uniform cast-in-place concrete frameworks, with openings in the slabs for vertical mechanical chases and stairs within individual units. To allow for variation and changeability in unit designs, the location of Support elements was determined by as series of capacity studies " (Kendall and Teicher, 2010, p. 84). **Flexible housing strategies:** Variation and changeability, technology and building material (cast-in-place concrete frameworks), social and cultural values, modularity.

6.3.2 Understanding and attitudes towards flexible housing

This section presents the reasons why people change and transform their houses. Evidence of houses undergoing some form of modification; either being extended, refurbished

or demolished were observed during the fieldwork research in Mochudi in 2013. It was recorded that all the 35 households under study had undergone some form of transformation whether physical, spatial or simply a change in use. The interviewees stated a wide range of reasons for transformations such as a change in functional needs, aspirations, increase in family growth, the need to improve the quality or availability of resources to build a better house. The majority of the transformations were for aesthetics or social status such as replacing traditional materials such as mud and thatch with concrete and metal roofs. Other reasons were economic such as adding rooms for rent. Table 6.11 identifies and lists these factors as observed from the field study. Unfortunately, these changes are mostly uncoordinated and unplanned. This often compromises the quality of future developments.

TABLE 6.11: A table showing reasons why people would like to make improvements to their house and their current employment status.

Sources of Funding	**Employment Status**				
	Employed	Self-employed	Unemployed	Retired	**Total**
Increase in family	1	10	13	3	**27**
Increase space	2	7	8	3	**20**
Increase income	—	3	3	—	**6**
Availability of funds	3	12	11	1	**27**
Social status	1	6	11	1	**19**
Use improved materials	2	11	13	3	**29**
Improve thermal comfort	2	10	12	2	**26**
Connect services	—	3	4	—	**7**

The goal of the scenario workshops was to identify any challenges that might prevent people from adopting flexible housing strategies to meet their housing needs. After the introduction of the project's concepts in Table 6.9, participants were asked knowledge based questions to establish their understanding of the concept of flexible housing. Unsurprisingly none of the participants demonstrated any knowledge of flexible housing concepts. However it later emerged that this strategy has been used even though informally in existing self-help houses in Mochudi. While participants practised this approach, it was not done as a strategic and methodical process to improve the quality of housing over time.

6.3.3 Perceived benefits of flexible housing approach

At the end of the workshop, the participants were asked to identify opportunities or barriers that might prevent flexible housing strategies from being implemented in Botswana's cultural and economic context. This section extends on the perceptions and attitudes towards self-help housing presented in Section 6.2.5. These are opinions and suggestions by the participants on how this concept can be applied successfully in Mochudi:

> "... this will not work until there is a change in the institutional framework".
>
> "... we need to make building regulations and codes relevant".
>
> "... the technology and materials used are expensive and are not familiar to most builders".
>
> "There is need for more enablers - subsidized land, low interest loans ...".
>
> "... We should allow people freedom to build and be less prescriptive".
>
> "... those who want to live in big houses but do not have the money to do so this will be a good idea for them. However you need good designers and good builders for these ideas to work or else they will fail".
>
> "The houses do look simple and we can easily do that ourselves".
>
> "Most people often buy and immediately modify or rebuild to suit their needs, hence it implies that what is readily available does not meet their desired houses".
>
> "This approach does not recognise the importance of cultural rituals and norms, nor does it recognise people's needs and lifestyle rituals ... It is mostly about form and aesthetics".
>
> "Our policies are not all-encompassing. They segregate people by income brackets e.g. if you are in a certain income bracket you are not allowed access to funds for a certain income group (especially low-income group) whereas, on the other the financial institutions consider you as unqualified to get a housing loan".

6.4 Conclusions

The aim of this chapter was to introduce flexible housing strategies to empower end-users and local builders with design knowledge through a participatory process. Another objective was to build awareness of alternative solutions that can improve the design and construction quality of self-help housing. The design methods were introduced using scenario workshops through PAR in focus groups. The study acknowledges that there are several perspectives in housing research that are important but cannot be dealt with in a single workshop or research study. It is for this reason that the ultimate aim of these two-day workshops was to explore and assess the barriers to the use of flexible housing strategies for self-help housing in Botswana. The idea was not to suggest that flexible housing is a priority or the only solution for self-help housing, but to demonstrate the potential and the challenges of adopting this strategy for self-help housing in Mochudi. The aim was achieved as end-users and local builders appreciated the advantages to adopting a flexible housing approach to improve the quality of self-help housing in Mochudi.

Chapter 7

Observations and analysis

7.1 Introduction

This chapter presents the findings from the data collection and analysis. The findings are based on thematic analysis (Section 4.6.1 in Chapter 4). The research questions (Section 1.2 in Chapter 1) are discussed within the interpretive frameworks (Section 4.2.2 in Chapter 4) and theoretical constructs (Section 4.7 in Chapter 4). Table 7.1 gives a summary of the theoretical constructs and key observations from this study.

TABLE 7.1: A summary of the theoretical constructs and key observations.

Theoretical constructs	Research methods / Data collection	Key observations and analysis
Theoretical constructs I: *Section 7.2 and 4.7.*	**Case study research.** Structured and semi-structured interviews: *Section 4.5.2 and 4.5.4.* Drawings and photographs: *Section 4.5.5.* Survey maps and physical survey: *Section 4.5.5.* Documents: *Section 4.5.5.*	i) Social needs, values and aspirations: *Section 7.2.2.1.* ii.) Space use and organization: *Section 7.2.2.2.* iii.) Flexibility in form: *Section 7.2.2.3.*
Theoretical constructs II: *Section 7.3 and 4.7.*	**Participatory action research.** Open-ended discussions - Focus group: *Section 4.5.3.* Scenario workshops: *Section 4.4.2.4.*	i.) Understanding, participation and empowerment: *Section 7.3.2.1.* ii.) Roles of local builders and owners: *Section 7.3.2.2.*
Theoretical constructs III: *Section 7.4 and 4.7.*	**Participatory action research.** Scenario workshops: *Section 4.4.2.4.*	i.) Understanding and usability: *Section 7.4.2.1.* ii.) Provider and supporter paradigms: *Section 7.4.2.2.* iii.) Design - a form of cultural expression: *Section 7.4.2.3.*

7.2 Theoretical constructs I: Socio-cultural transformations

7.2.1 Introduction

The main objective of the theoretical construct was to present how social structures, beliefs and cultural values are reflected in housing and settlement patterns. This forms the basis for exploring appropriate design strategies for housing in Section 7.4 and 7.3. The premise of these theoretical constructs is that in order to develop design interventions that would improve the quality of housing, first we need to understand the social and cultural processes that create dwellings in Botswana.

7.2.2 Key observations and analysis

The codes and themes were developed using thematic analysis. Figure 7.1 shows the themes and codes organized into nodes using NVivo software. NVivo allows themes and codes to be easily organized, managed and sorted for systematic analysis (Bazeley and Jackson, 2013; Walsh, 2003).

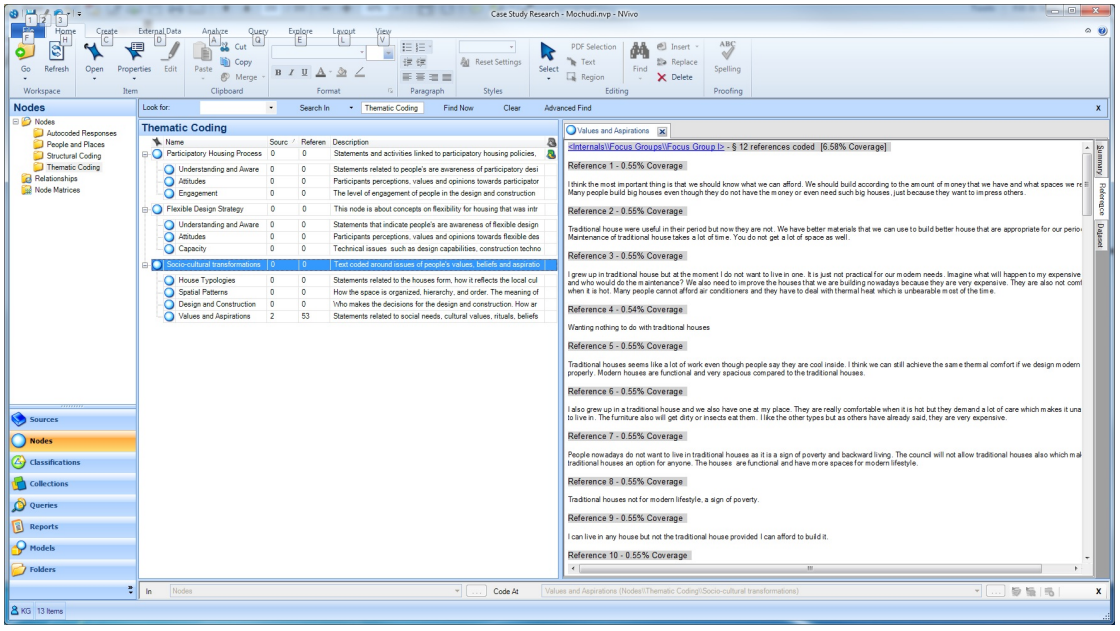


FIGURE 7.1: Socio-cultural transformations codes and themes were developed in NVivo using thematic analysis process.

The following section presents the key findings under the individual themes in *theoretical construct I*. Each theme in *theoretical construct I* examines cultural and social opportunities or barriers in using flexible housing strategies for self-help housing in Botswana.

7.2.2.1 Social needs, values and aspirations

This theme is mainly about the meaning of dwelling as understood and practised in the context of Mochudi. Figure 7.2 shows nodes developed under this theme from the coded text. The theme examines people's social needs, cultural values, beliefs, ritual practices, and aspirations in housing. The structures, networks and family relationship nodes are also coded under this theme as an attempt to understand the physical transformations of housing.

This theme codes the reasons or the desires by end-users to change their dwellings in order to improve the quality of their living environments. Table 6.11 (Section 6.3.2 in Chapter 6) gives an account of improvements that participants desire for their housing.

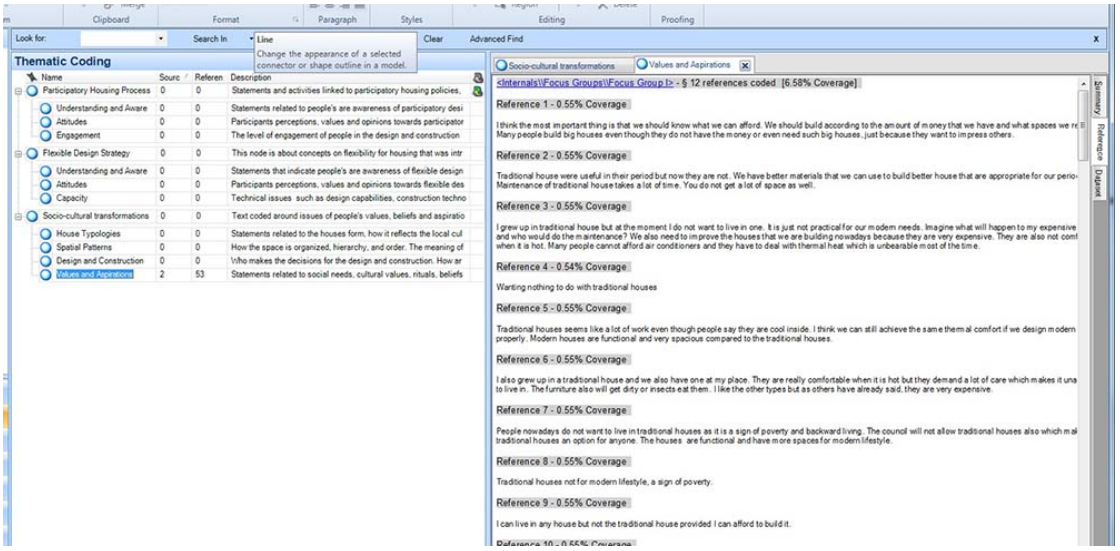


FIGURE 7.2: Values and aspirations nodes coded in NVivo 10.

The responses from the participants reveal the three major reasons for housing transformations and change as: the use of modern (industrial) materials, the increase of family members and the availability of funds. The residents also expressed the desire to improve the thermal comfort of their housing. The results show that thermal comfort is an important factor but it is not the subject of this study.

As already mentioned in previous chapters, families have changed from extended to nuclear families. The contemporary families are more independent and private with less opportunities for interaction. The yards are also fenced with solid walls for both privacy and security (see Figure 7.3a). However, there are still some that are fenced with wire mesh or thorn branches due to lack of finance. Separation is not a contemporary solution because in the past, neighbours did not share plot boundaries with each other (see Figure 7.3b). This was done to avoid conflicts on the responsibilities of maintaining the fence. The other reason that the residents raised was that they do not want their property to be weakened by their neighbours' *muti* (traditional herbs placed around the yard).

The other important factor that influenced the transformations is the availability of finance. Table 5.7 in Section 5.5.5 (Chapter 5), shows different sources of financing for a new house or refurbishments. A large number of unemployed and self-employed respondents expressed dissatisfaction with their current housing situation. They cited lack of funds or access to financial aid due to their employment status as the main reason as to why they cannot improve the quality of their housing.

Table 6.11 shows that a few people expressed the desire to connect or improve sanitation, water and power sources in their homes. Sanitation is through pit-latrines which are

(A) Contemporary yard separation for privacy and security.

(B) Traditional yard separation to avoid conflicts.

FIGURE 7.3: Boundary separation.

smelly and unhygienic, but they are not a major concern to the residents (see Figure 7.4a). Only a few are connected to electricity, with the majority relying on candles and kerosene for lighting. These figures indicate that many of these households do not meet the requirements of a decent house (see Figure 7.4), according to the definition of decent housing given by UN-Habitat.

(A) Pit-latrine.

(B) Outdoor standpipe.

(C) Firewood for cooking.

FIGURE 7.4: Many households do not meet minimum standards of a decent house as defined by UN-Habitat.

7.2.2.2 Space use and organization

This theme examines the meaning of architectural space as it relates to the use of space, space hierarchy and activities or functions of houses under study. It was observed that the meaning of architectural space, space use and spatial hierarchy in contemporary houses has been transformed to reflect modern aesthetic tastes and functional needs. For example, there has been a significant reduction in plot sizes coupled with the introduction of building controls and development regulations. In the past people were allocated larger plots which gave them more space for social activities such as weddings and funerals. It was customary for weddings and funerals to be held inside people's

yards. These social events also brought families and community members together during celebrations or mourning periods. Contemporary yards are much smaller, leaving little or no outdoor space for social events. Despite the recent allocation of small plots, Mochudi is still considered low-density as reflected in Table 5.3 and 5.4 (in Section 5.2 in Chapter 5).

These observations demonstrate that these changes have led to transformations in house forms and use of space. However, it was also observed that flexibility through an adaptable use of space is still dominant in traditional areas in Mochudi. The respondents said they adapt their use of spaces depending on various factors such as the change of weather, accommodating seasonal visitors and for temporary but important social events such as weddings. For example, many people cook outside, but when it is raining, some rooms are changed into indoor kitchens (see Figure 7.5).

(A) Cooking in the outdoor kitchen.

(B) Interviewing an interviewee outside.

(C) Mother resting with kids outside.

FIGURE 7.5: Outdoor spaces are used for various activities.

Sections 5.5.3 in Chapter 5, demonstrated that spaces are used interchangeably depending on the needs of the family. The comments from the residents suggested that they prefer to build single-storey dwellings in low-density areas. They also expressed that they are not willing to share spaces with strangers. These revelations demonstrate the importance of cultural values in housing.

7.2.2.3 Flexibility in form (aesthetics and image)

This theme examines how house forms, aesthetics and styles relate to local culture, local climate, local technology and materials. There is a pre-occupation with the form and image of a house as was reflected in the comments from the research participants in the previous chapter. However, many are unable to build the houses they desire because of the costs involved. Traditionally, the form and arrangement of houses was a reflection of people's social structure and political power. However, contemporary houses are built primarily to meet spatial or functional needs. There is still a social significance for building a house even though the purposes are different. For example,

many respondents commented that they would like to build a big house to gain respect from their neighbours. This is no different from the past when having many houses in a compound was a reflection of the wealth and the number of wives a man has (Schapera, 1994; Schapera and Roberts, 1975).

Another significant observation was the change in the form of houses; from a single circular room hut to a house with multi-rooms under one roof. The current housing in Mochudi, built of simple forms of concrete and galvanized metal roof materials, are a reflection of new architecture built to meet the taste of today's society. Following on Lawrence (1987, p. 16)'s definition of vernacular architecture, the contemporary housing becomes the 'new' vernacular. Lawrence (1987, p. 16) believes that,

> "... vernacular buildings are those which belong to a type that is common in a given area at a given time".

The most common type of transformations that were observed was the demolition of traditional and one-room detached housing types as illustrated in Figure 7.6. For many households, their mud and thatch houses, as well as one-room shack-like houses were built due to a lack of resources. When the owners' economic situation changed, they were replaced with houses of better quality. For those that cannot afford to completely replace these houses, they usually render mud walls with cement plaster or replace thatch roof with galvanized metal roofs.

(A) Obsolete hut used as a storage.

(B) Hut plastered with cement render.

(C) Thatch roof on concrete walls.

FIGURE 7.6: Transformations of house forms and space.

As already noted, Mochudi is a place of low-density with single storey houses standing as discreet units. The generous yard spaces allow for easy horizontal extensions. People add rooms wherever they find space available. This study proposes that these extensions can be better coordinated and improved through a flexible and formal design process which is presented later in this chapter.

7.2.3 Conclusions

The findings presented the importance of social needs and cultural values in self-help housing. The findings support the *theoretical construct I*, that it is important to reflect the social needs, beliefs and cultural values in the physical structure and spatial organization of housing. The research themes identified significant changes in the architectural forms and designe space that people use to express their social values and cultural identity in self-help housing. The findings also revealed that Mochudi has undergone major social and cultural transformations. These transformations have led to new house forms, aesthetics and styles, using new building materials and technologies. However, these transformations are driven by informal design and construction approaches which depend on trial and error. There is a need to develop design strategies that follow set standards and good practices. The hypothesis is that a 'formal' and flexible housing strategy is an efficient approach to deliver self-help housing without compromising quality.

The challenge in developing a formal design and construction approach, is not to take away the existing responsibilities and decision-making processes from the end user as wisely advised by Turner (1977). The study revealed that houses built by the users reflect their cultural values and social needs. This demonstrates that it is important to develop strategies that allow for user-participation in the design and construction of self-help housing projects. The following section discusses the theoretical constructs on user participation in design.

7.3 Theoretical constructs II: Participatory housing processes

7.3.1 Introduction

The main objective of the study was to collaboratively develop appropriate design processes that empower users to build houses that are socially and economically sustainable in Botswana's specific context. The premise of the theoretical constructs is that in order to develop design interventions that would improve the quality of housing, the end-users and the local builders should be key decision-makers in the process (Awan et al., 2013; Habraken and Valkenburg, 1972; Turner, 1977). The aim is to encourage and develop participatory housing policies, enabling and inclusive frameworks to improve housing delivery methods (Hamdi et al., 1995). The following sections examine the key activities and observations from the scenario workshops to achieve this objective.

7.3.2 Key Observations and Analysis

Figure 7.7 shows the themes and codes organized into nodes in NVivo.

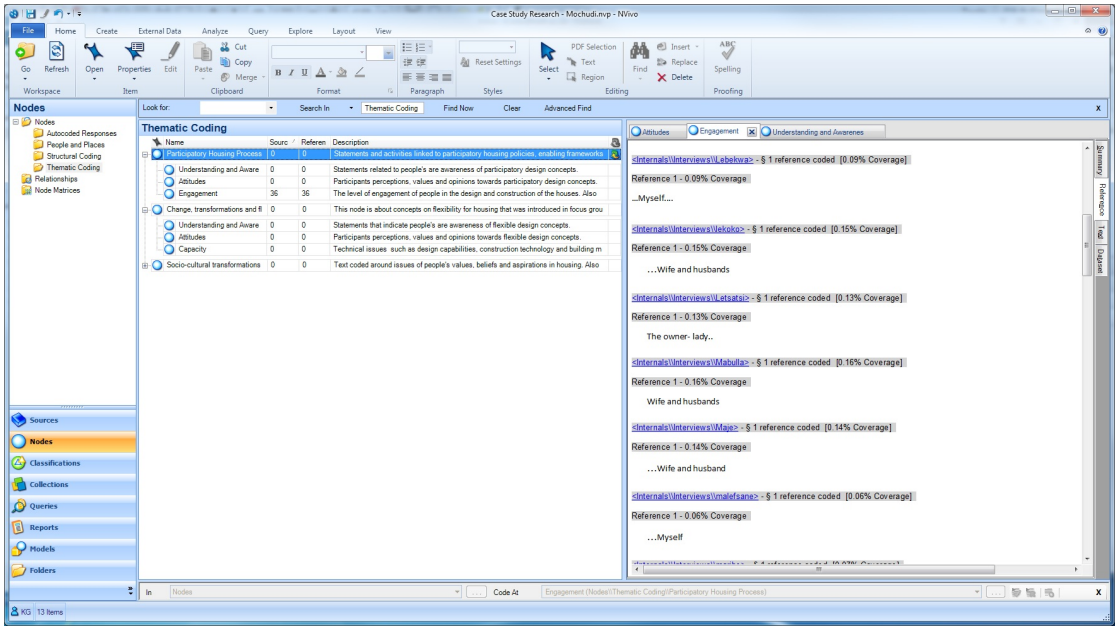


FIGURE 7.7: User-participatory codes and themes developed in NVivo using thematic analysis process.

The following section presents the key findings under the individual themes in theoretical construct II. Each theme in *theoretical construct II* examines cultural and economic opportunities or barriers in developing a socially appropriate and collaborative design interventions for self-help housing in Botswana.

7.3.2.1 Understanding, participation and empowerment

This theme examines participants' levels of understanding, engagement and empowerment in using participatory design concepts and processes. The participants in this focus group were not technical people. However, the scenarios were developed to raise an awareness and empower the end-users and local builders with design skills that can easily be adapted for their own use. The *theoretical construct I* demonstrated that user-participation is important in developing houses that are socially and economically appropriate. However, residents in marginalized or poor communities do not have the design tools and skills, nor the economic capacity or the political power to engage in a formalized approach in housing (Hamdi et al., 1995). It is for this reason that a participatory design research method was developed to empower ordinary end-users with skills to improve the quality of their built environment.

The scenario workshop for this PAR were conducted in a community place familiar to the residents to help them feel safe and secure. The design tools were easy to understand and simple to use. However, they were still chosen to rigorously investigate the research aims and questions.

The participants worked on individual and collective activities as part of the collaborative process. Each participant was provided with markers, papers and wooden blocks to use in the workshop activities. The tools were chosen to engage and empower participants and to allow them to be actively involved in the decision-making process during the workshop. The tools were meant to simply introduce a complex phenomena that could not easily be understood by people who do not have technical skills. Despite the simplicity of the tools and methods used during the workshop, there were some challenges especially in explaining technical terms using the local language. Also, some participants were hesitant to take part in some of the activities because they did not feel confident or qualified to be part of the workshop. This is partly due to the high illiteracy rate. It was particularly more challenging with the drawing activities because many of them were not used to drawing. However, participants soon discovered that drawing was not as difficult as they initially thought after experimenting with the drawing tools.

It was easier for participants in the second workshop to use the wooden blocks to develop a house design. They could manipulate the blocks and were having fun with them unlike the drawings. This proves that some tools are more easily understood than others. These tools can easily be adopted to empower ordinary users to design and build their own houses.

It was observed that discussing pictures of flexible housing projects was more engaging than that of using drawings or wooden blocks. However, using blocks was more interactive and allowed participants to generate new forms and housing typologies (see Section 6.2.4 in Chapter 6). Drawing ranked amongst the least successful method of participation and empowerment in this workshop (see Section 6.2.3 in Chapter 6).

7.3.2.2 Roles of local builders and owners

This theme examines the roles and responsibilities, decision-making processes, tools and methods used in the design and construction of houses. The houses that were studied in Mochudi were 'designed' and built by the owners, with the help of the local builders (see Figure 7.8a). Figure 7.8 shows self-help houses built under different housing schemes. Figure 7.8b and 7.8c are houses built under the Self-Help Housing Assistance (SHHA) Loan Improvement Scheme and the recently established Single Housing Authority (SiHA) respectively. The major difference is that SHHA gives financial assistance to house

owners to build houses for themselves whereas SiHA builds finished houses for the recipients. Houses built under the SHHA and SiHA schemes are not considered for this research because the high cost of these models is not economically sustainable.

The change from the traditional construction approach has also reduced the social responsibilities of women in maintaining their homes. Previously, the women were responsible for both the construction and maintenance of the houses. The use of concrete and corrugated metal roofs requires skills that are predominantly the domain of male builders. As a result, the owners either build the houses themselves or hire a local builder.

(A) House built with no assistance.

(B) SHHA Loan Improvement scheme house.

(C) SiHA Turn Key Loan scheme house.

FIGURE 7.8: Houses built under different self-help housing schemes in Mochudi.

The three housing schemes in Figure 7.8, are driven by different socio-economic models. Table 7.2 is a comparative study of the level of control and decision-making processes in these schemes. The table is modified from Turner (1972)'s study of patterns of decision and control in housing in Peru. It shows similar patterns for SiHA, SHHA and self-funded (Owners) housing initiatives in Botswana.

Government Funded				Self-Help Housing		
Plan	Constr	Manage		Plan	Constr	Manage
●	●	●	SiHA	–	–	–
●	–	●	SHHA	●	●	●
–	–	●	Owners	●	●	●

TABLE 7.2: A decisions-making processes for SiHA, SHHA and self-funded housing initiatives. Modified from Turner (1972)'s study of patterns of decision-making and control in housing in Peru.

Table 7.2 shows that self-funded housing projects gives owners greater freedom and control to build houses that reflect their social needs and cultural values. SHHA and

SiHA schemes lack in the responsibility, participation and empowerment of end-users. SHHA and SiHA are politically and economically driven, with the number of housing units more important than the social responsibilities of empowering people through participation. The aim for this study is to change from the current 'provider' (for example SHHA and SiHA) to a 'supporter' housing model. This is investigated by developing a flexible housing strategy through a participatory process in a focus group.

The majority of residents stated that they build their houses with the help of a hired builder. The builders are the informal 'architects' and 'engineers' for the housing projects. In terms of design, builders usually make minor modifications on the existing typologies based on their experience and the clients' social and economic needs. The builders work in collaboration with the owners, who are both the clients and the project managers. Also the owner provides the financial and material resources.

The housing construction industry is Mochudi is predominantly informal as already discussed in Chapter 5. Usually there are no written documents or contractual agreements between the client and the builder. The role and responsibilities of both the client and the builder are not formally defined. For example, at times builders' role can involve the making of the building materials such as concrete blocks for their clients even though they are not hired for that purpose. Their roles can also extend from specifying materials to the negotiating and actual purchasing of building materials from the manufacturers or suppliers on behalf of clients.

7.3.3 Conclusions

The findings revealed the importance of developing design strategies that empowers end-users and local builders to participate in the design and construction processes of self-help housing. The study supported the theoretical construct that end-users and local builders are key to effectively deliver self-help housing. In order to achieve this objective, the findings demonstrated that it is critical to develop tools that are easy to understand and use as demonstrated by the work of Sanders and Stappers (2012). This way, people are empowered to be the key decision-makers in the building of their houses and can ensure that they meet their social and economic needs. The research also supported the need to develop participatory housing policies, as well as enabling and inclusive frameworks to improve housing delivery methods (Hamdi et al., 1995). However, the major challenge revealed by this study was the lack of design tools and methods that allow people to participate in the design and construction of their housing. As a result, the houses do not reflect people's values, aspirations and social needs. To address this challenge, the research proposes flexible housing strategies as an effective

method that responds to the continuously changing social needs and cultural aspirations of self-help housing dwellers. This is discussed in the next theoretical construct.

7.4 Theoretical constructs III: Change, transformations and flexibility in use

7.4.1 Introduction

The premise of this theoretical construct is that a flexible housing strategy is a socially and economically viable method for housing delivery in low-income communities. As already stated, the hypothesis is that a flexible housing approach responds to continuously changing social needs and aspirations without compromising the quality of housing. The intended outcome of the study was to introduce flexible housing strategies for self-help housing. Flexible housing explored through PAR, re-introduces the concept of simplified and replicable design in housing; a continuation of traditional Tswana architecture.

7.4.2 Key Observations and Analysis

Figure 7.9 shows the themes and codes organized into nodes in NVivo.

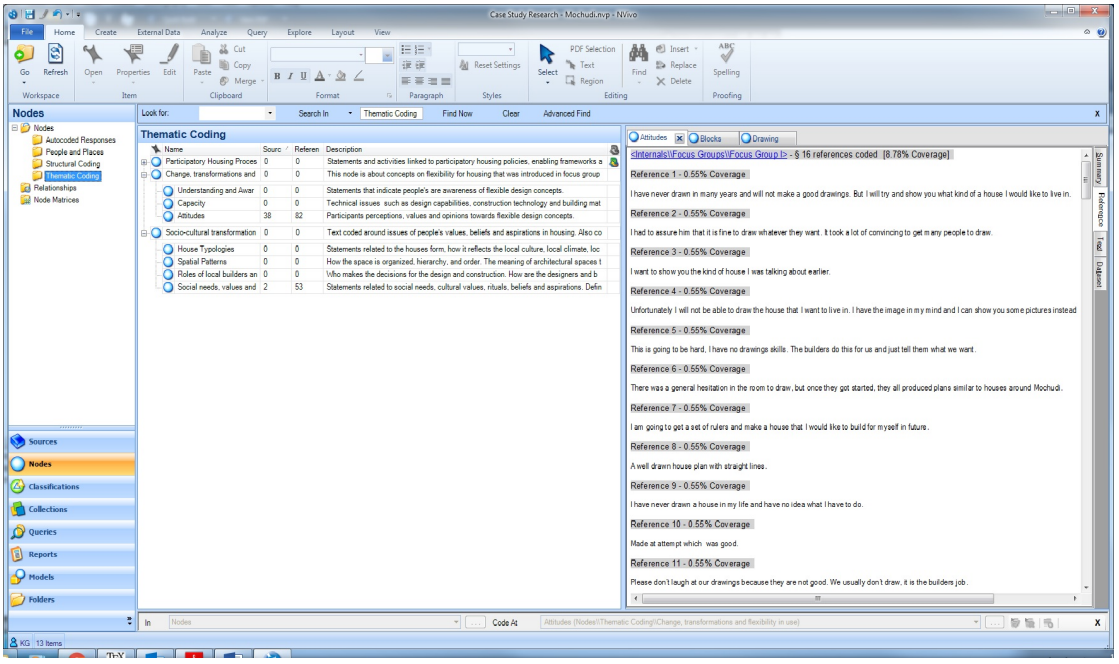


FIGURE 7.9: Codes and themes developed from the flexible housing workshop.

The following sections present the key findings from each individual theme in *theoretical construct III*. Each theme examines the understanding and usability of design tools

and the flexible housing projects shown to the participants. The aim was to determine opportunities or barriers in adopting flexible housing concepts for self-help housing in Botswana.

7.4.2.1 Understanding and usability

This theme examines the understanding and usability of design tools that would enable end-users to adopt flexible housing concepts for self-help housing by themselves and with local builders. There are two main design methods that were used during the workshop to introduce the flexible housing concepts to the participants. These methods were to use drawings and wooden blocks to create various house types. Also, pictures of projects built using flexible housing methods were shown to the participants as a way of illustrating the successful application of these design concepts.

The participants understood the concepts easily when shown the pictures of built projects. However, when using drawings it was not easy for them to understand the concept. This is partly because pictures of flexible housing projects were shown after the participants had experimented with the drawing tools. The other reason is that they lacked confidence in using drawing as a design tool.

While it was the first time for the participants to learn about flexible housing strategies, they understood the social and economic benefits of adopting the approach for self-help housing. This is reflected in some of the comments they made:

> "It is not easy to access land especially for the youth and this will certainly help. We will have to change the way we live which will not be easy. As Batswana we are used to owning large pieces of land and not sharing with strangers".
>
> "Yeah it does look like it can work for those of us who do not earn that much. The problem will be sharing and not having our own space in the yard. How are we going to have funerals and weddings if we do not have a space of our own? If it can work for individual houses that is great but I do not like the idea of living with a group families as that will will create a lot of problems".
>
> "...I am not sure that I would like to share a house with other families though, it is something that will take sometime to get used to".
>
> "That is what we did before the council introduced new regulations. We can easily do that but I do not agree with living with strangers. I know it

> seems like it saves land but we have important social activities that require a lot a space in the yard. Some of these events are private and living with strangers will create problems. We can still use the same idea for our own private houses".

The participants raised concerns over sharing houses in the same yard with 'strangers'. Traditionally, Batswana are used to having their own yard and living only with close family members. However, participants were reminded that even though the concept is illustrated using multi-residential typologies, it is applicable to single family housing as well. Single-family dwellings are common practice in Botswana as already discussed in previous chapters. Despite participants' anxieties about sharing, other participants pointed out that currently, many people live in rented rooms with people they do not know:

> "... we are already sharing our rented houses with strangers. If by adopting this concept, means that we will be able to reduce land shortages and construction costs then I am willing to share with others to have a roof over my head. ... we do not have land and the money from the government is not enough ... this approach looks like a good alternative".

> "... As others have already mentioned living with strangers will definitely create problems but we experience the same in our rental homes. Our attitude will have to change and that will take time but the idea is worth trying".

A majority of the participants expressed hope that this approach will address land challenges facing the poor. However, they were still not comfortable with the idea of sharing with strangers:

> "... I never heard of this concept but now I think the government should try it. I complained about the lack of land and this will definitely help the situation. The problem will always be our culture as we are not used to living with people we do not know like in other countries. It is a very big challenge that may lead to people fighting".

> "I think the problem will be the people not the concept. People are used to having big pieces of land even though they do not use it for anything. It will be hard to convince them to share with others. There are many people fighting with their neighbours over spaces that are outside their yard and you can only imagine what will happen when they have to share spaces in the same yard".

The financial benefits of a flexible housing approach was widely appreciated by the participants. For example, participants reported that:

> "I did mention earlier that we need to build double storey houses because of the smaller plots we are given ... I know that double storey houses are very expensive and not affordable to many people, but this idea will make it possible".

> "It is something that I think can work really well for many people who depend on their savings for building".

Even though the participants appreciated the idea and understood the benefits of adopting a flexible housing approach others were skeptical. Their main contention was the idea of sharing the yard with other people which is a historic problem in Tswana societies.

7.4.2.2 Provider and supporter paradigms

This theme examines the conceptual housing paradigms that would enable adopting flexible housing concepts for self-help housing in Botswana. The theme explores the concepts of flexible housing design as an alternative approach to the current provider housing model. The provider model, which uses conventional design and construction methods, has proved to be uneconomic and unsustainable (Stren, 1990, p. 35–53; Pugh, 1997).

As mentioned in previous chapters a majority of people depend on informal businesses or employment which disqualifies them from obtaining a mortgage from financial institutions. Also, the government does not have a sufficient budget to provide housing for people in need. The only available option for the majority of residents is to find other means to house themselves using their own resources. One method of housing themselves that has been commonly practised over the years is incremental housing. Incremental housing is usually achieved through flexible housing strategies (Aravena and Iacobelli, 2012; Kendall and Teicher, 2010; Schneider and Till, 2007). However, due to a lack of design knowledge and an informal approach to incremental housing, the design and construction quality of the houses in Mochudi is usually compromised. The main reason is that the capacity to meet future demands, changes and transformations that occur over time are not planned in the initial design (Habraken and Valkenburg, 1972). Therefore, the additions and extensions that occurs over time compromises the structural and aesthetic qualities of these houses as illustrated in Figure 7.11.

Unlike houses built from the government schemes, that are occupied only after completion (see Figure 7.8c), self-help houses are built and used simultaneously (see Figure 7.11).

(A) Unplanned extensions compromising building structure.

(B) Alterations compromising the aesthetics of the house.

FIGURE 7.10: The informal alterations are not planned at the initial stage of design and construction, leading to additions and extensions that compromise the structural and aesthetics quality of houses.

This theme discusses two main housing paradigms; the supporter and the provider paradigms as defined by Hamdi et al. (1995, p. 26–29). Both the provider and supporter housing models are commonly practised in Botswana. Only a brief definition of the theory and concepts behind these housing models is given here, with a more detailed discussion in Chapter 3. According to Hamdi et al. (1995, p. 26–27), the provider paradigm is common and largely supported by government, while the supporter paradigm is focused on:

> "... the management of resources, including land, labour, skills, services, utilities, materials, and money".

The respondents expressed preference for both the provider and the supporter model. They believe that the government should assist with land, finance and infrastructure. However, they also strongly believe that they should be allowed to build houses according to their social needs and cultural values without being 'harassed', or without too much interference from local authorities.

However, literature shows that the provider model has a limited impact on addressing housing challenges (Bredenoord and van Lindert, 2010; Hamdi et al., 1995; Mosha, 2013). Therefore, the focus for this study was on houses that were built by the residents depending on their own resources. It was observed from the fieldwork that they already build houses through progressive development over time. The informal and incremental development process depends on the residents' needs and the availability of resources. Figure 7.11 shows the informal additions and extensions observed in Mochudi.

This theme has demonstrated that self-help housing (the supporter housing model) can benefit from a flexible housing approach. Incremental housing which is commonly

(A) Foundation ready for house extension.

(B) A veranda is added to an existing houses.

(C) A house occupied while still under construction.

FIGURE 7.11: Informal alterations of structures, additions and extensions of self-help housing in Mochudi. The incremental changes takes place over a period of time to respond to the social needs of families according to their economic situation.

practised in Mochudi can successfully deliver quality housing for residents who have limited resources and design skills. This can easily be achieved through flexible housing interventions. A flexible housing framework is proposed as an alternative conceptual approach to the conventional self-help housing design strategies in Botswana.

7.4.2.3 Design - a form of cultural expression

This theme identifies and examines how design can be used in housing to meet social needs and cultural values. The aim is to change housing from a product-oriented approach to a process-oriented approach. The theme is investigated through a flexible housing process, or more specifically, an incremental housing concept. This means design and housing is seen as a process that evolves over time (Turner and Fichter, 1972).

It is widely acknowledged in housing and architectural design research that modern settlements and housing lack identity and character as were reflected in their traditional predecessors (Lawrence, 2000; Rapoport, 2006; Venturi, 1977). However, most of the research does not identify the traditional characters that have been lost and how they can be incorporated back into modern housing (Asquith, 2005). The premise of the research is that a flexible housing approach would encourage Batswana to build houses that are culturally-inspired and also reflect their social needs. This approach also encourages local residents and builders to avoid the dehumanizing standardized housing approach, common to social and public housing schemes (Hamdi et al., 1995; Turner, 1977). A flexible housing approach through a PAR framework is proposed as an appropriate strategy for housing in Botswana's context. This theme investigate the benefits of adopting a flexible housing process in terms of the building form, affordability, building materials, construction technologies and building regulations as previously studied by Kendall and Teicher (2010); Schneider and Till (2007).

As already described previously, different design tools were used to create housing types during the two-day workshops with the focus groups. The first group used markers and paper to create houses of their choice. The second group used wooden blocks to create house types of their choices as well. The drawing process and the outcome are presented in Chapter 6. Similarly, the process of using blocks is recorded in Chapter 6. The participants' actions, views expressed and expectations are recorded in Appendix F. The two approaches resulted in different outcomes and views expressed by the participants. In using the wooden blocks, participants cited the scale of the blocks as being too small for design explorations. Ideally, blocks of a larger size would have been used but it was not practical and affordable for this study. However, the participants found it easy to 'play' with the blocks and generate new housing typologies (see Figure 7.12). Figure 7.12 shows the new typologies developed using the wood blocks. This was not the case with drawings from the first focus group.

(A) (B) (C)

FIGURE 7.12: New housing typologies were created using wooden blocks.

It was noted during the discussions that affordable and appropriate building materials are required for a flexible housing approach to be implemented successfully. Currently, houses are built using industrial and imported materials. The use of imported materials and sophisticated tools makes construction a domain for 'professional builders' only. As already presented in previous chapters, affordable construction materials are sold informally in backyards or on the sides of the road. Even though these materials are not intended for flexible housing processes, they offer the potential to be used in design and construction for self-help housing projects.

7.4.3 Conclusions

The findings revealed the importance of a flexible housing strategy to overcome the social and economic challenges for housing people in low-income communities. The conventional design approaches and methods have proved to be socially inappropriate and economically expensive for residents in Mochudi. This is mainly due to a lack of a responsive design approach to the continuously changing social needs and economic

conditions of these communities. The social housing (provider models) are delivered through a standardized design approach, which is a dehumanizing way of housing people (Hamdi, 2010). This study demonstrated that a flexible housing approach allows end-users to express their social needs and cultural values within their economic capabilities to improve the quality of their housing. A flexible housing strategy also empowers people to participate in the design of their dwelling and enables them to build their houses incrementally without compromising the quality of their environment. This study demonstrate that a flexible housing strategy will also encourage housing that is rooted in the socio-economic and climatic context of Botswana. The workshop activities and the illustration of built projects using flexible housing concepts allowed participants to understand and appreciate the value of adopting such an approach. However, the study also highlighted technical and cultural challenges that need to addressed for a flexible housing approach to be effective.

The theme also revealed that the financing of flexible housing and construction methods for self-help housing will require alternative housing models to be adopted. There are several examples of successful projects that were delivered using a flexible housing approach with innovative financial model which were introduced in this study. For example, the Quinta Monroy social housing project by Elemental in Chile (Aravena and Iacobelli, 2012). The architects adopted innovative design and economic housing models to accommodate 100 families on a budget of 30 families if conventional approaches was used (Aravena and Iacobelli, 2012). They proved that design can be used as a solution to social and economic challenges in low-income communities (Aravena and Iacobelli, 2012). Another important aspect of their work is that social housing should not be subjected to dehumanizing standardized design, but can be of high quality (Aravena and Iacobelli, 2012).

7.5 Conclusions

This chapter presented observations and findings discussed within the interpretive frameworks and theoretical constructs. The findings support *theoretical construct I*, which states that it is important to reflect people's social structure, beliefs and cultural values in self-help housing. The findings reveal the importance of developing design strategies that empower end-users and local builders to participate in the design and construction processes of their living environments. This was investigated through *theoretical construct II*. *Theoretical construct II* demonstrated that a flexible housing approach is a cost-effective strategy that empowers ordinary users and local builders, with no formal design skills, to customize their designs in self-help housing. *Theoretical construct III* introduced flexible

housing strategies as socially and economically viable methods for housing delivery in low-income communities. The three theoretical constructs were successfully carried out using case study research and participatory action research (PAR) with the use of focus groups. The outcome from this workshop study demonstrated that a flexible housing approach is economically viable and culturally sustainable. The concluding discussions and recommendations from this study are presented in the next and final chapter.

Chapter 8

Conclusions and recommendations

8.1 Introduction

This chapter discusses the conclusion from the empirical research findings and the recommendations for theoretical and practical housing intervention methods. It sets out by summarizing the theoretical constructs which confirm the importance of a flexible housing approach to improving the quality of self-help housing. The theoretical, procerual and/practical contributions of this work is discussed in Section 8.3. This chapter concludes by giving an overview of research limitations and further areas for research. Table 8.1 gives a summary of how the research questions, aims and objectives were achieved through the theoretical constructs developed for this study.

Table 8.1: Relationship between research questions, research aims and theoretical constructs.

Research questions / problem	Research aims / objectives	Theoretical constructs
How are cultural identity and social needs defined and expressed in housing design processes?	**1.** Understanding the beliefs and motivation of design processes associated with self-help housing communities in Botswana. Discussed in Chapter 2. **2.** Encourage housing that is rooted in Botswana's socio-cultural values and climatic conditions *(Vernacular architecture)*: Chapter 2 and 3.	*Theoretical constructs I.* Discussed in Section 8.2.1.
How effective are the current design processes in building economically and culturally sustainable housing in Botswana?	**3.** Identifying architectural forms and design spaces that people use to express their social values and cultural identity in self-help housing: Chapter 2 and 3. **4.** Encouraging self-help housing as a cost effective housing model in developing countries *(Self-help housing)*: Chapter 3.	*Theoretical constructs II*: Section 8.2.2.
What design methods are socially-appropriate for self-help housing in Botswana's context?	**5.** Allow user-participation and empowerment in housing processes *(Collaborative & participatory design)*. Discussed in Chapter 3 and 6. **6.** Proposing a flexible design strategy to minimize initial building costs but maximizing future growth by offering possibilities to change and adapt to future use (Payne, 2006, p. 167) *(Flexible design)*: Chapter 6.	*Theoretical constructs III*: Section 8.2.3.

8.2 Discussions of theoretical constructs

The methods to achieve the objectives and aims of this study were defined within the interpretive frameworks and theoretical constructs presented in the methodology chapter. The observations and analysis of each theoretical construct have been presented in the previous chapter. Even though each theoretical construct was analysed separately, they form an integrated approach in developing appropriate design strategies for self-help

housing in Botswana. This section summarises the theoretical constructs which demonstrate the appropriateness of a flexible housing strategy to improving the quality of self-help housing in Botswana.

8.2.1 Theoretical constructs I: Socio-cultural transformations

The main objective of this theoretical construct was to present how social structure, beliefs and cultural values are reflected in the physical structure and spatial organization of housing and settlement patterns. The premise of this theoretical construct is that incorporating cultural values in design results in appropriate housing that is able to respond to people's social needs and while also being sensitive to the environment.

The study observed significant changes in architectural forms and design spaces, which reflect people's changing social values and cultural identity in Mochudi. The outcome of the interviews indicated that residents in Mochudi prefer modern buildings, regardless of how inappropriate they might be to their cultural values, social needs and local climatic conditions. These observations and interviews confirm that the traditional methods are no longer viable for modern housing needs and social aspirations.

Another reason to study cultural and traditional practices is that architects and researchers in developing countries interested in housing, often look to import sophisticated technological solutions without giving much value to the existing local cultural practices and traditional methods (see Rapoport (1998; 2006) and Fathy (1986), for a review). Those architects and researchers argue that the traditional methods are no longer viable for modern housing demands (Fathy, 1986, p. xvi-xvii). In his critique of modern housing in Egypt, Fathy (1986, p. xxi), who over many decades advocated for a systematic study of vernacular architecture to inform contemporary housing, illustrates this point clearly by stating that:

> "... the modern architect of the Third World, suddenly released from this gravity, and unable to resist temptation, accepts every facility offered to him by modern technology, with no thought of its effect on the complex web of his culture."

Fathy (1986) contends that these solutions are not always superior or perform any better, both economically and socially, than the local methods developed over many years to meet the community's particular housing needs. This is not a criticism against the use of imported technologies or modern materials, but serves to highlight the importance of study in understanding local cultural values and traditional methods that can make important contributions to self-help housing design. Fathy (1986, p. xx) proposes that architects' technical knowledge and historical understanding of building design puts

them in a greater position to develop appropriate buildings methods that respect local forms that can inspire people to respect their own cultural practices.

This theoretical construct demonstrated that there is still much to learn from the traditional housing approach that can greatly improve the quality of housing in Mochudi. Therefore, there is a need to identify and re-establish appropriate cultural and social meanings in traditional Tswana architecture and incorporate them into contemporary housing design. The research findings support the theoretical construct that traditional Tswana architecture forms are an important basis on which to develop an appropriate design strategy for current and future housing.

8.2.2 Theoretical constructs II: Participatory housing processes

The premise of this theoretical construct is that in order to develop design interventions that would improve the quality of housing, the end-users and the local builders in Mochudi should be the key decision-makers in the process. This is informed by the self-help principles which place key-decision making responsibilities in the hands of the inhabitants (Turner, 1977, p. 155). Turner (1977, p. 89–101) contends that self-help housing as a process can adequately meet people's housing needs and gives the dweller control over what is appropriate for them. Turner (1977) as he argued for self-help housing wrote:

> "I will go beyond that to suggest that the ideal we should strive for is a model which conceives housing as an activity in which the users as a matter of economic, social and psychological common sense are the principal actors" (Turner, 1977, p. 154).

Based on self-help housing principles, a participatory approach was introduced as a strategy to address some of the shortcomings of the traditional top-down housing delivery model discussed in previous chapters. This study identified the positives as well as the shortcomings of the provider-supporter housing models which are currently in practice in Botswana. Empirical evidence and literature have demonstrated that the provider paradigm, which is the traditional top-down housing delivery model popular in developing countries, is uneconomic and unsustainable (Hamdi et al., 1995, p. 26–29). On the other side, the supporter housing model, combined with a participatory design approach, leads to less expensive buildings as it reduces costly changes after construction (Hertzberger, 2005; Kroll and Blundell-Jones, 1986). Therefore, the aim of this theoretical construct is to encourage the development of participatory housing policies, enabling inclusive frameworks to improve housing delivery methods.

The participatory approach proposed in this study, combined with the supporter housing models, requires active participation and engagement of the end-users and local builders in Mochudi to be successful. Unlike the traditional top-down design approach, an architect, or designer's role become that of enablers or facilitators rather than of 'experts' (Hamdi et al., 1995). The other reason for adopting a participatory process is partly due to the researcher's previous participation in a community design and build projects as already stated. Experience from these projects has led to an interest in the transformative power of social architecture through a participatory process (Bell and Wakeford, 2008). These projects and findings from this study demonstrates that architecture can be used as a medium to engage ordinary users and local builders to learn, interpret and create form and space (Bell and Wakeford, 2008).

Another interesting point which makes the flexible housing approach more relevant to this research is that both Kroll and Blundell-Jones (1986) and Hertzberger (2005), have demonstrated how the use of standardized industrialized components with advanced design techniques leads to affordable housing that reflects people's social needs. While these projects and studies in traditional architecture clearly shows that user participation is necessary, the process has been lost in modern housing. This study seeks to re-introduce the principles of a participatory approach for self-help housing which can then be extended to policy development and financial policies.

The study demonstrated the importance of consultation for a participatory approach to be effective. Consultation is an important aspect of the Tswana culture. The previous chapters discussed the various levels of participation by the residents in their community, in terms of their social, economic and political decision-making process. In the past, people took an active role in the designing and construction of their houses, with the help of their families and local builders. This has changed recently because the political and economic powers have moved from the traditional system to the central and local government. As a result, the role of users has been changed or reduced significantly.

The research participants expressed their unhappiness towards the lack of consultation when introducing new developments in their communities. They also mentioned that even when consulted, their views are not taken into consideration when implementing development policies. To address these shortcomings, this study introduces a participatory design approach to empower participants with technical skills necessary to improve the quality of their housing. Using a participatory approach in design, architecture becomes a medium for Mochudi residents to express their cultural values in their self-help housing developments. Consequently, architecture becomes a platform to design and make dwelling spaces that gives people dignity and a sense of belonging (Bell and Wakeford, 2008).

8.2.3 Theoretical constructs III: Change, transformations and flexibility in use

The ultimate goal of the study was to introduce flexible housing strategies to improve the quality of design and construction for self-help housing. This was introduced through a participatory research process using scenario workshops. The main argument of this theoretical construct is that flexibility minimizes initial building costs but maximizes future growth by offering possibilities to change and adapt to future use (Payne, 2006, p. 167). This makes flexible housing strategies a socially and economically viable method for housing delivery in low-income communities.

The literature review and case study research revealed that design is considered to be a foreign and unimportant concept in self-help housing communities as they rely heavily on informal processes. However, one of the major challenges identified in this study is that traditional design strategies in self-help housing are not initially planned for future growth even though it inevitably happens (Larsson, 1996). The evidence from the study shows that traditionally, self-help housing was never in the realm of professional designers or was it developed based on formal processes (Habraken and Valkenburg, 1972). It was for this reason that only the residents and the local builders were invited to participate in the focus group workshops. While it is clear that informal practices dominate these poor and low-income communities such as Mochudi, Habraken (1988, p. 19) contends that it is possible for these communities to adopt formal technologies and design processes. Habraken (1988) further states that formal processes often inspire informal processes to be effective. An example is that of informal manufacturing businesses that were set-up in Mochudi to meet the needs of self-help housing at an affordable price. This clearly shows that with practice and time, complex technologies and technical skills such as design can easily become common knowledge and available to ordinary people (Habraken, 1988).

The literature and fieldwork research interviews revealed that in the past the process of designing, building and the use of houses occurred simultaneously (Lawson, 2006b, p. 23). Also, there was no separation of roles between the users, builders and craftsmen in the design and building processes (Lawson, 2006b, p. 23). Kellett (2003) observes that occupation and construction took place simultaneously and the houses were usually in the process of dynamic change. This is not to suggests that these societies did not design, but it was never a formal activity (Habraken, 1988, p. 13). It is also a suggestions for design professionals to consider the existing social structures in these societies when introducing foreign concepts such as 'design' (Habraken (1988); Kellett (2003)). These observations by both Habraken (1988) and Kellett (2003), offer important lessons for contemporary housing in Mochudi. However, the evidence from the scenario workshop

demonstrated that this requires changes at many different levels such as culturally, socially, politically and economically for it to be successful.

People living in self-help housing continuously change their houses to meet functional and social needs over time. Designing for unpredictable, uncertain and continuously changing cultural values, social needs and climatic condition requires a flexible housing strategy, which can adapt to changes over time (Brand, 1994). Flexible housing methods were introduced as an alternative approach to traditional design methods and also to accommodate the needs of designers (Schneider and Till, 2007, p. 13). This is achieved by introducing innovative research and creative technical knowledge that is not usually available to ordinary users and local builders (Aravena and Iacobelli, 2012).

The evidence from the scenario workshops confirmed the importance of a flexible housing strategy to overcome the social and economic challenges for housing people in low-income communities. The study also revealed that local builders and users possess important knowledge that they have accumulated over the years, but it is often limited to their own experience of the locale. To compensate for their lack of design knowledge, they rely on standardized and imported 'design solutions'. This approach has proven to be economically unsustainable and has also resulted in houses that are not only structurally unsafe, but culturally inappropriate.

It is important to note that flexible housing processes and participatory design approaches also raise some important practical questions such as the role and responsibilities of the designer, the users, and the authorities. As important as these issues are, they are considered to be secondary for this study.

8.3 Contributions of research findings

8.3.1 Contribution to theory: Housing and design

Chapter 2 revealed that there is limited academic and political interest in housing research and practice in Botswana. This has led to little published work and theoretical development on housing research, policy evaluation reports and generally scattered and inconsistent information data. The theoretical assumptions developed through empirical investigation in this study are an attempt to close the gap in the current housing research and practices in Botswana. While there are no theoretical conclusions that can be drawn from this research, the application of flexible housing theories developed in other countries to this study contributes to the knowledge and theoretical development of improving the quality of self-help housing in Botswana. The empirical studies contributes

to the development of a theory on improving the quality of self-help housing through flexible housing strategies. Also, this work is an important foundation for further development of theoretical and philosophical positions by other researchers and practitioners.

8.3.2 Contribution to participatory housing policies

The study revealed that self-help housing in Botswana is practised informally which makes it difficult to be acknowledged by funding bodies in various government ministries and departments. Also, it was observed from the fieldwork that due to the informality of the self-help housing industry, the developments are unmonitored and unmanaged. This results in a poor quality of housing. Consequently, this important housing delivery method does not get any governmental support due to the lack of a formal approach.

The findings from the case studies in Mochudi showed that despite attempts by academia, public institutions and private enterprises to improve the delivery of housing to the poor, housing demands continue to rise. The study revealed that this is mainly due to the shortcomings of the provider's housing models prevalent in developing countries, such as Botswana. The pros and cons of this approach have been reviewed extensively throughout this thesis. The conclusion of this study is that the traditional approach of the provider's housing model has failed. To address the shortcomings of the provider's housing models, this study identified flexible housing interventions that engage and place key-decision making responsibilities in the hands of the end-users and local builders, as appropriate strategy for improving the quality of self-help housing in Botswana. The findings from this study demonstrated that self-help housing models developed with a flexible housing approach are a viable alternative for providing shelter to the majority of people who are socially and economically excluded from the mainstream housing industry. This approach, which places design initiative and greater decision-making control in the hands of the users, also helps transform housing from a product-oriented approach to a process-oriented design process.

The introduction of a flexible housing strategy for self-help housing is an invaluable contribution this work makes towards housing policy development in Botswana. The study demonstrated how progressive and systematic design methods in architecture, can benefit communities where there are no 'formal' or 'official' supports. Flexible housing methods and tools introduced in this study enabled residents and local builders in Mochudi to improve their quality of housing within their economic and social means. If successful at the household scale, the process can be a basis for the formulation of housing policies and design guidelines at community, regional and national levels. It also enables policy-makers and housing professionals to develop policies that are responsive

to the cultural and social needs of people in Botswana. The other advantage is that the approach applies to other uses as well such as schools, clinics or other important community buildings.

It is important to note that this study does not suggest that flexible housing strategies are the only appropriate method that can improve the quality of self-help housing. Rather it is introduced as an innovative design approach and economic model that can address the shortcomings of the current approach to self-help housing in Botswana. However, the research findings also noted some major cultural challenges (discussed in Section 6.3) that need to be addressed for this to become an appropriate strategy for housing in Botswana's context. Addressing the cultural challenges raised by the research participants, will inevitably require changes not only at an individual level, but also at regional and national levels. As noted by the participants during the workshops, this strategy requires political willingness from the government to be successful.

8.3.3 Contribution to knowledge

As already stated, there is limited academic and political interest in developing housing research in Botswana. As a result, data about housing in Botswana is generally scattered and inconsistent. This has led to little published research work and poor housing policies. Investigations of the social and cultural values in self-help housing in Mochudi, and a review of literature on anthropology, politics, sociology, geography and the history of Botswana have revealed important information that advances the existing knowledge in Tswana architecture. Through an extensive literature review, this study identified conventional design approaches and methods as socially inappropriate and economically expensive for residents in Mochudi. The study proved that flexible housing strategies can be adopted as an effective self-help housing method for people to house themselves within their economic and social means in Mochudi. These lessons are also useful for architects, academia and political leadership to incorporate into their housing policies and design strategies.

The application of flexible housing concepts to residents and local builders in Mochudi is an important contribution to design methods that improve the architectural knowledge of housing in Botswana. To the best knowledge of the author, this type of knowledge did not exist before. As already pointed out flexible housing methods have been practised successfully in other parts of the world but not in Botswana. These innovative design concepts and unconventional economic models for housing, are unknown in Botswana. Therefore, this thesis makes an important contribution to the body of knowledge about

how appropriate and sustainable self-help housing strategies, participatory approaches and flexible housing strategies can improve the quality of housing in Botswana.

8.3.4 Contribution to method

The study applied case study and participatory action research methods and various data collection methods within the respective theoretical constructs developed in this research, to determine appropriate design strategies for improving the quality of self-help housing in Botswana. The first part of the research applied a case study research method to understand the cultural values and social processes in self-help housing in Mochudi. The case study presented empirical evidence to determine if there is a need and desire for a design strategy in Mochudi. The outcome of the study was that the residents and the local builders, who are key-decision makers, and are largely poor and rely on informal economies, do need a socially and economically appropriate design strategy to improve the quality of their self-help housing. The second part of the research applied participatory action methods which identified a flexible housing approach as an appropriate and viable design method for self-help housing in Botswana. Flexible housing methods were investigated using drawings and wooden tools which allowed the author to collaboratively identify appropriate design processes with the residents and the local builders, that empower them to build houses that are socially and economically sustainable in Botswana. This process revealed the importance of developing research methods and design tools that empower end-users and local builders to improve the design and construction quality of self-help housing in Botswana. These research methods and design tools made it possible to explore appropriate design interventions based primarily on empirical evidence gathered through in-depth fieldwork studies. As a result, this research presents a flexible housing approach as a method that can be applied in research, practice and policy development to improve the quality of self-help housing in Botswana.

8.4 Limitations and further areas for research

Even though this study has made some important contributions to addressing some of the housing challenges Botswana faces, there are limitations on using these research findings. The main reason for limitations is that the challenges in housing are many and complex, with no single solution to address them (Fathy, 2010; Habraken and Teicher, 2000; Hamdi et al., 1995; Kent, 1990). This is particularity so when considering the cultural and social factors which are immeasurable and subjective, often dependent on

the intuition of the researcher (Rapoport, 1969b). The following are the limitations and further areas for research identified in this study:

(i) *Philosophical assumptions and beliefs:* This research does not begin by making explicit philosophical positions and assumptions. This is mainly because there is no particular field that deals with dwelling as a discipline and has developed theories in housing (Oliver, 2010, p. 14, Kent, 1990, p. 1–2). This is likely to present validation and evaluation challenges. To address these limitations, a multi-disciplinary approach to housing is adopted and this allows the research to benefit from concepts, theories and data from other disciplines (Kent, 1990).

(ii) *Data collection and analysis:* The collection and analysis of data is not based on any standard format. Therefore, data collection and analysis is prone to bias and error. However, validation and evaluation procedures were established to avoid errors and bias in data collection and analysis (discussed in Section 4.8 in Chapter 4).

(iii) *Case study:* Self-help housing was chosen for this study which excluded other types of houses. It is important to note that this decision was made after the pilot study, which eliminated the need to study other types of houses. The other limitation is engaging only the residents and local builders in exploring possible design intervention to improve the quality of self-help housing in Mochudi. Due to time and resource limitation, other stake holders such as government departments, practising architects and community leaders could not be engaged in the research.

(iv) *Design methods:* This thesis has achieved its main objective of introducing flexible housing strategies to the residents and the local builders in Mochudi. However, other methods should be introduced so as not to limit the choice to only one method. The other limitation is the lack of time to rigorously develop the design methods with the research participants. Therefore, it is impossible to draw conclusions that can be generalised and validated for other contexts. However, it was not the intention of this study to create a design framework to be used in other contexts from these workshops. The main objective was to introduce the concepts of flexible housing through a participatory approach to residents and local builders in Mochudi. The lessons from these studies can be generalised and validated by conducting further studies in different contexts.

identified a flexible housing approach as an appropriate model that responds to continuously changing social needs and aspirations without compromising the quality of self-help housing

8.5 Conclusions

This study aimed at identifying appropriate design strategies that respond to continuously changing social needs and aspirations without compromising the quality of self-help housing in Botswana. The design explorations were conducted using the participatory action research (PAR) method. It was during the scenario workshop activities with the focus groups that flexible housing concepts were introduced. A flexible housing approach was found to be economically and socially appropriate for self-help housing in Mochudi. Flexible housing methods empowered the end-users and local builders with the flexibility to incorporate their social needs and cultural values into the design and construction of their self-help housing projects in Mochudi. During the scenario workshops a better understanding of the theoretical and practical applications of a flexible housing approach led to the development of new design typologies which were not common in Mochudi. This is a clear demonstration that flexible housing strategies introduced through a participatory approach empowers ordinary users and local builders, with no formal design skills, to create innovative housing typologies never build before in Mochudi. As a result, the study achieved its aims by identifying a flexible housing strategy as an appropriate method for improving the quality of self-help housing for end-users and local builders in Mochudi. This also improved on their experience and knowledge of using progressive design approaches. The other achievement was to demonstrate that self-help housing can be subjected to the rigours of architectural design without losing its social and economic role. Another important practical application of flexible housing strategies is that it is not only applicable at the household scale but can be the basis for the formulation of housing policies and design guidelines at community, regional and national levels. In addition to being used at different scales, a flexible housing approach can be applied to other uses as well such as: schools, clinics or other important community buildings. In conclusion, the thesis provides empirical evidence of identifying design solutions that can improve the quality of self-help housing. This study fills the existing knowledge gap and advances a better understanding of incorporating flexible design strategies in self-help housing in Botswana. This enables researchers, practitioners, policy-makers, and most importantly the end-users and local builders, who are key-decision makers, the ability to improve the quality of self-help housing in Botswana.

Appendix A

Focus group research questionnaire in Mochudi

Design Workshop

---

1. Participant Information - CODE: B-M03

Name of Interviewee _____

Contacts _____

Rent or Own a House _____

Education _____

Occupation/Role _____

Date _____

Statement of Confidentiality

The personal information collected is only used for this research purposes. The answers to this questionnaire are confidential and are intended solely for this research. I would like to be able to publish some of the answers attributing them to you. However, before doing this I will ask your permission in writing giving you the text of the quotations together with details of the context in which they are to be quoted.

---

2. Housing - Meaning, Values & Aspirations

	Most Important				Least Important
Form (Aesthetics and Image)	☐	☐	☐	☐	☐
Social and Spatial needs	☐	☐	☐	☐	☐
Symbolic and Cultural Values	☐	☐	☐	☐	☐
Financial (Affordability and Maintenance)	☐	☐	☐	☐	☐
Material and Building Technology	☐	☐	☐	☐	☐
Policies and Building Regulations	☐	☐	☐	☐	☐
Environmental and Performance Criteria	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

In what ways can we solve the housing challenges?

	Most Important				Least Important
Form (Aesthetics and Image)	☐	☐	☐	☐	☐
Social and Spatial needs	☐	☐	☐	☐	☐
Symbolic and Cultural Values	☐	☐	☐	☐	☐
Financial (Affordability and Maintenance)	☐	☐	☐	☐	☐
Material and Building Technology	☐	☐	☐	☐	☐
Policies and Building Regulations	☐	☐	☐	☐	☐
Environmental and Performance Criteria	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

3. Designers and Builders

- How important are the following responsibilities of a designer or architect to housing?

	Most Important				Least Important
Design	☐	☐	☐	☐	☐
Building	☐	☐	☐	☐	☐
Technical advisor	☐	☐	☐	☐	☐
Choosing/buying of Material	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

- How important is the following responsibilities of a builder to housing?

	Most Important				Least Important
Design	☐	☐	☐	☐	☐
Building	☐	☐	☐	☐	☐
Technical advisor	☐	☐	☐	☐	☐
Choosing/buying of Material	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

- How important are designers and builders in housing?

0	1	2	3	4	5
☐	☐	☐	☐	☐	☐

Least important **Important**

4. Appropriate Housing

- Which house do you think is the is most appropriate for Botswana?

	Form	Materials-Technology	Spatial	Cultural-Social	Climatic
TYPE 1	☐	☐	☐	☐	☐
TYPE 2	☐	☐	☐	☐	☐
TYPE 3	☐	☐	☐	☐	☐
TYPE 4	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

- Do you think flexible design approach is appropriate for housing in Botswana?

	Financial	Materials-Technology	Skills-Knowledge	Cultural-Social	Building-Regulations
Yes	☐	☐	☐	☐	☐
No	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

---

5. Design Tools or Methods

- What tools do you use for the design of your houses?

	Frequent				Never
Verbal description	☐	☐	☐	☐	☐
Examples of built houses	☐	☐	☐	☐	☐
Examples from different media (TVs, magazines)	☐	☐	☐	☐	☐
Manual Drawings	☐	☐	☐	☐	☐
Computer Drawings	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

- What could be improved, if any, to make housing design and construction methods appropriate?

Skills and Knowledge	Design Methods and Strategies	Building Standards and Regulations	Materials and Technology	Policies	Other (please specify)
☐	☐	☐	☐	☐	☐

---

6. PAR - Form Creation

- The use of drawings media

	Easy				Difficult
Willingness/Desire	☐	☐	☐	☐	☐
Knowledge and skills	☐	☐	☐	☐	☐
Explorations/Transformations	☐	☐	☐	☐	☐
New typologies	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

- The use of physical models - card, paper, found materials?

	Easy				Difficult
Willingness/Desire	☐	☐	☐	☐	☐
Knowledge and skills	☐	☐	☐	☐	☐
Explorations/Transformations	☐	☐	☐	☐	☐
New typologies	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

- The use of architectural blocks and elements?

	Easy				Difficult
Willingness/Desire	☐	☐	☐	☐	☐
Knowledge and skills	☐	☐	☐	☐	☐
Explorations/Transformations	☐	☐	☐	☐	☐
New typologies	☐	☐	☐	☐	☐

Others: ..... _____
Please explain

Appendix B

Semi-structured interviews sample

HOUSEHOLD OCCUPANTS INFORMATION

1. Information on house occupants

1.1. House Location & no…….. Date: ……

1.2. Contacts……..

1.3. Plot Size……

1.4. Date Occupied……

1.1. The house is - Owner occupied ☐ Owner and Tenants☐ - Tenants only☐

1.2. Owner's name:……..……..

1.3. Person interviewed ……

1.4. Sex: ……

1.5. Education: .....……

1.6. Occupation……

1.7. **Household occupants**

No. of persons in the households	Age & Sex	Year Occupied and Tenancy	Remarks

2. Land Acquisition and Year of Acquisition

2.1. Tribal Land

2.2. Inherited

2.3. Bought

2.4. Rent/lease

2.5. Other (Specify)

3. Social Relations

3.1. How did you end up living in Mochudi?

3.2. What is your relationship to other members of the household?

3.3. Where are your other relatives? Where do they live?

3.4. Your relationship to your neighbours? How long have you known them?

3.5. Are there rituals in the community that people practice?

3.6. Do you perform any rituals during construction of a house?

3.7. Do you perform any rituals before occupying any piece of land or house?

4. Evaluative questions

4.1. What do you like most about your house? Form, Space, Materials, etc.?

4.2. What do you like the least about your house? Form, Space, Materials, etc.?

4.3. What improvements would you like to make to your existing home? Form, Space, Materials, etc.?

4.4. What style of housing would you like to live in? Form, Space, Materials, etc.?

4.5. What do you like most about your community?

4.6. What do you like the least about your community?

4.7. Would you like to be living somewhere else if possible?

5. Housing Typologies & Building Material

(Scaled Drawings and Photographs to be included)

Housing type	(Area, m^2)	Building Material		
		Floor	Walls	Roof
TY1				
TY2				
TY3				
TY4				
TY5				
TY6				

Key
TC=Thatch, CR=Concrete Roofs, CB=Concrete Blocks, FB=Fired Cement-Stabilized Bricks, SD=Sun-dried Mud-Bricks, CP=Concrete Plaster, CF=Concrete Slab

6. Activities and Spatial Use

(Observation)

6.1. Typical day activity and Spaces

Activities	Space			
	Indoor		Outdoor	
	Private space	Shared spaces	Inside the Yard	Outside the Yard
Sleeping				
Cooking				
Eating				
Home-based enterprises				
Social activities (wedding, funerals, guests, etc.)				

7. Building Costs

(Scaled Drawings and Photographs to be included)

	(Cost)	Building Material Cost				Labor
		Floor	Walls	Roof	Other	
TY1						
TY2						
TY3						

TY4						
TY5						
TY6						
Total						

8. Housing Improvements (Alterations and Extensions)

(Scaled Drawings and Photographs to be included)

	(Change)	**Building Material**				**Labor**
		Floor	**Walls**	**Roof**	**Other**	
TY1						
TY2						
TY3						
TY4						
TY5						
TY6						
Total						

Key

DM=Demolition, RA=Room Addition, PP=Plastering and Painting, TC=Thatch, CR=Concrete Roofs, CB=Concrete Blocks, FB=Fired Cement-Stabilized Bricks, SD=Sun-dried Mud-Bricks, CP=Concrete Plaster, CF=Concrete Slab, WD=Windows and Doors, UC=Utility Connections, RE=Renewable Energy, TK=Toilet & Kitchen

9. What factors influence housing development?

a) Increase in family members

b) Availability of finance

c) Building houses for rent

d) Desire to build a modern house

e) Adopting new construction materials

f) Improve the quality of houses

g) Aging building materials and maintenance challenges

g) Energy, water, sanitation, etc.?

	(Change)	**Remarks**
TY1		
TY2		
TY3		
TY4		
TY5		
TY6		

10. Impact of Housing Development?

a) Increase in household income?

b) Improved quality of houses?

c) Improved indoor comfort?

d) Status in the community?

e) More indoor space?

f) Durable and low maintenance materials?

g) Other? (Specify)

11. Current state of the buildings

(Scaled Drawings and Photographs to be included)

	Building Material				Remarks
	Floor	**Walls**	**Roof**	**Other**	
TY1					
TY2					
TY3					
TY4					
TY5					
TY6					

12. Household Income & Expenditure?

1.1. Income

Item	Daily Income	Monthly Income	Remarks
Formal Employment			
Household Enterprises			
Farming			
Family (Children & Relatives)			
Government			

13. Design and construction of Houses

1.1. Who make decisions regarding design and construction of houses?

1.2. Who designed your buildings? Architect, builder, self, friends and family?

1.3.

1.4. What was the process of design and construction?

1.5. Who constructed your buildings? Self and family, community, hired builder?

1.6. How and where did you source materials? Found locally, friends and family, bought, exchanged?

1.7. Is it easy to find building materials in this area?

1.8. How did you choose a builder? Your relationship to the builder.

1.9. In your opinion, what are the most important factors that determine housing development? Finance, Use, Aesthetics, Material, Ecological, Regulations?

1.10. What building materials and construction technology you would consider to be technical and economical feasible in Botswana?

14. Housing Financing

	Source	**Building Material** Cost				**Labor**
		Floor	**Walls**	**Roof**	**Other**	
1	Savings					
2	Family Contributions					
3	Farming, eg selling cattle					
4	Monthly earnings					
5	Government Loan					
6	Bank Loan					

Appendix C

Survey questionnaire sample

Click to email

Statement of Confidentiality

HOUSING QUESTIONNAIRE

1. Information on Interviewee

1.1. Name of Interviewee _____ Date: _____

1.2. Email _____

1.3. Occupation _____

1.4. Research Interest: _____

1.5. Education: _____

Confidentiality

The personal information collected is only used for these research purposes. These records will remain confidential. Any personal information that could identify you will be removed or changed before files are shared with other researchers or results are made public.

2. Roles & Responsibility

2.1. How often do you work on residential or housing projects?

Frequently ○ Occasionally ○ Seldom ○ Never ○

2.2. What is your role and responsibility in housing research?

_____

2.3. What is your approach and process in housing research? (Please explain)

_____

2.4. Do you work with other professionals and/or other organizations in housing design and construction? If yes, please explain their role and your role.

2.5. Have you worked in informal housing research projects? If yes, please describe the project.

2.6. Do you think the housing stakeholders are using research information effectively to address housing needs? (Please explain)

3. Housing Policy and Development Strategy

3.1. Are you aware of any existing housing policies and administrative structures in place to address housing needs in Botswana?

3.2. What are your views or understanding of the current housing developments and policies in Botswana? (Please explain)

3.3. Do you think the existing policies and structures can cope with housing needs in Botswana? (Please explain)

3.4. What do you consider to be a housing problem Botswana? (Please explain)

3.5. What could be the reasons that Botswana is facing housing problems? (Check all that apply)

Land Policies and Management	☐	Finance	☐
Housing Policies	☐	Inappropriate Design	☐
Construction Materials	☐	Construction Methods	☐
Social and Cultural Aspects	☐	Other	

3.6. In your opinion, what are the most important factors that people should consider for housing development? (Check all that apply)

Function	☐	Finance	☐
Aesthetics	☐	Building Regulations	☐
Construction Materials and Methods	☐	Environmental Factors	☐
Social and Cultural Aspects	☐	Other	

3.7. There are many housing solutions that have been applied around the world with varying success. Which one do you think would be most appropriate for our cultural and economic context? (Check all that apply)

site and services	☐	settlement upgrading	☐
core service and wet areas	☐	shell building	☐
self-building	☐	cooperative housing	☐
co-housing	☐	Other	

3.8. What improvements you would like to see in housing policies and strategies in Botswana? (Please explain)

3.9. Who are the main housing suppliers in Botswana in your opinions? (Rate on a scale of 0-5, with 0 the lowest and 5 the highest)

Government	☐	Private Sectors	☐
self-help Housing (Individuals)	☐	NGOs	☐
Parastatals	☐	Other	☐

4. Environmental Design (Low-impact Materials, Thermal Comfort, Energy use, Water and Waste management)

4.1. What factors do you consider important for sustainable housing? (Check all that apply)

Function / Spatial Organization	☐	Land-Use	☐
Water and Energy	☐	Building Regulations	☐
Construction Materials and Methods	☐	Other	
Social and Cultural Aspects	☐		

4.2. What factors do you consider the most important for sustainable housing? (Check all that apply)

	Very important	Not very important	Not important At all
Lighting	○	○	○
Ventilation	○	○	○
Thermal Comfort	○	○	○
Social and Cultural Aspects	○	○	○
Land-Use / Site	○	○	○
Function / Spatial Organization	○	○	○
Building Regulations	○	○	○
Construction Materials and Methods	○	○	○
Water and Solar Harvesting	○	○	○
Recycling and Waste Management	○	○	○

Other (Please explain)

4.3. What are your thoughts on environmental performance of housing in Botswana? (Check all that apply)

	Excellent	Satisfactory	Poor
Lighting	○	○	○
Ventilation	○	○	○
Thermal Comfort	○	○	○
Social and Cultural Aspects	○	○	○
Land-Use / Site	○	○	○
Function / Spatial Organization	○	○	○
Building Regulations	○	○	○
Construction Materials and Methods	○	○	○
Water and Solar Harvesting	○	○	○
Recycling and Waste Management	○	○	○

Other (Please explain)

5. Building Standards and Regulations

5.1. Are you aware of any existing rules or regulations guiding people in housing design, construction methods and material use? (Please explain)

5.2. In your opinion, do the current building standards and regulations influence housing design and construction materials in Botswana? (Please explain)

5.3. Do you think the current building code and regulations are effective? (Please explain)

Appendix D

Respondent's comments on housing affordability

D.1 Responses on the question of affordability of housing in Botswana

I think the most important thing is that we should know what we can afford. We should build according to the amount of money that we have and what spaces we really need. Many people build big houses even though they do not have the money or even need such big houses, just because they want to impress others.

More about affordability and building houses to meet our needs, not social status.

The loan that the government is giving for self-help housing initiatives is way too little. It is only enough to build just a one bedroom house and that is if you have land. Also using modern materials and builders makes it very expensive for the poor to afford building houses for themselves.

New buildings are of better quality but very expensive. Not many people can build houses they want because they do not have the finances to do so.

Quality cost a lot of money.

Land should be made available for the poor people. The government should also help them financial as the banks will never give them a loan.

Land should be made available and finance by the government

People should not desire what they cannot afford. We should be aware of our economic situation and build accordingly.

The government has to make land available to the youth because they cannot afford to buy land and build at the same time. If land is made available, maybe that will encourage more people to build their own homes rather than spend the rest of their lives renting.

I also grew up in a traditional house and we also have one at my place. They are really comfortable when it is hot but they demand a lot of care which makes it unattractive to live in. The furniture also will get dirty or insects eat them. I like the other types but as others have already said, they are very expensive.

We should consider the cost of the house that we are building so that we do not build houses that we cannot afford. People can always build more houses or extend their existing house if they can get more money in future.

Not happy with the regulations as they make houses expensive.

Maybe the council should change the regulation and allow people to build houses however they want. At the moment, it is expensive as we are not allowed to build as we please. Builders and architects charge us high fees and that makes building a house very expensive.

Only if I have money I will definitely live in double storey house but I know that is a just a dream.

Only if the council stop harassing us and let us build what we want, not what they want because we cannot afford that. There is no need for regulations for places like Mochudi but I understand for cities like Gaborone. The regulations are just complicated and not that important for me when I just want to build a simple house.

I can live in any house but not the traditional house provided I can afford to build it.

We should use modern materials and new technology that will make our house look beautiful. People should also engage professionals so that they advise them to make the best decisions. Many people that do not have advise end up building houses that they cannot afford or even like.

Some of these houses only the rich can afford. They do look nice but I can never be able to afford such a house.

A majority of people agree with the builder that there are many people who just want a 'big house' even though they cannot afford it or even need it.

We should not build houses for status and end up in huge debts. The government is playing its part and we should also help by providing labour and use our savings to build decent houses.

I have no experience building traditional buildings. People do not want them and I will not get any jobs. I usually prefer to do modest buildings as I have the experience building them. Most of my clients do not have a lot of money to build other types even though they would like to live in them.

We need to start taking land as a form of investment not only for us but for our children's future as well. Selling land is not helping many Batswana because they misuse the funds by buying things that has no value. The other option is to use funds generated from selling land for income-generating activities. However, I strongly believe that rather than selling land because they do not have finance for construction costs, people should team up with those who have money to raise funds needed to build houses for rental which will generate income rather than for a short-term solution by selling property. In addition to that, people should also take advantage of the government schemes because not many countries provide for its citizens as the Botswana government.

People should build houses that they can afford, there is no need for anyone to want to build mansion when you can only afford a 1 bedroom house. In the past, people built traditional houses because materials were readily available and they could not afford modern materials. The modern society is concerned about the image the house which comes at a cost of a huge financial debt.

Critical of people making wrong choices because they are concerned about the image of the house, not about building a house that they can afford.

Type 4 is just not possible in his lifetime.

As Batswana we like to have the whole yard to ourselves for social activities such as weddings and funerals. But it is almost impossible nowadays to own a house with a big yard because there is not enough land available. Most of us are resigned to renting for the rest our lives. I may have the money to build a house but then I still more money to buy land which is unaffordable. Therefore, I end up spending money renting rather investing on building my own house. My salary is also not that much to qualify me for a loan and that makes it hard to even think of building my own house. Where will I get P100, 000 just to buy land? I will then need about the same amount just build a basic house which is not even enough for my family. We are used to having land freely available to us and nowadays we have to pay a lot of money for land. There is no way that most people will be able to afford a piece of land in the cities, let alone build a

house of their own. The government will have to make land available before we can even think of owning houses

make land available to us and then we can find money to build houses for ourselves. The financial policies are helpful but it will the amount has to be increased if we are to build decent houses.

I think most people would like to live in a Type 4 but as we have already said, it is just not possible under this government. We do have a lot of money as a country but most people live in Type 1 because that is what we can afford, not that we like it or even offers enough space for our family.

I think owning my own house is a dream that I do not see happening anytime soon unless I will some lottery. If you think of how much the land cost and how much it cost it build a house, and compare that with my salary, then you know it is impossible for me to own a house. However, I will like to own a house for my family but that is only possible at my home village because land is freely available. Our government has a lot of money but they spend the money on useless things like security and private jets. All Batswana could be living in a decent homes if our economy was managed properly and the government prioritized on housing. The other option is to make jobs available that pays good salaries

Making jobs available that pays extremely well will definitely help. The financial schemes do help but they are not enough to cover the cost of land and building a house. If you want to build a decent house then you need a lot of money which you can only be possible if you have a good job and earning a good salary.

The money that I have I can only afford to rent a Type 1, not even owning it. My dream is to at least build a Type 3 even though I like Type 4, but it is for the rich people who have lots of money.

I only have a house at my home village because land here is not affordable. However, I will like a house for my small family. We are currently renting because we do not have money for land, or even to build a house. There are many people who have sold their land because they do not have money to build a house. The government scheme helps but the amount of money that is given is not enough. We are also not paid that much to even think of saving money for housing.

Critical that the government is not helping with land and finance. Disagreeing with those that think the government is doing enough.

If we can earn decent salaries then we can afford building our own homes. At the moment we have to choose between building a house or feeding your family. The policies also do not favour people who do not have land as they only give money for building a house. Maybe that can be changed as well to develop policies that assist in buying land.

Type 4 is for the rich, there is no way that I can ever live in such a house. I think realistically in my lifetime I can only afford a Type 2, and also that is after many years of savings.

Not much hope in ever owning a house.

I do rent only because I am not from here and therefore, I cannot build a permanent home. My house is at my home village as I cannot build a house in Mochudi as I will be retiring soon and going back home. All the money I saved over the years from working, I invested in building a house at my home village where my family is located.

Everything is expensive from purchasing land and the cost of building materials. It is one of the reasons why I chose to build only one house at my home village because land is free and labour is cheaper.

For me a modest house such as Type 2 is fine. I do not necessarily need a big house because I am old and not much concerned about what people thinks or say about my house. If you grew up in a traditional house then any modest modern house is likely to be satisfactory.

Seemingly content with just renting a Type 2 house.

The amount for financing a house from the government should be increased because it is just not enough. The houses we would like to build costs a lot more that what the government is giving us

Type 4 obviously is what most people would like but they cannot afford it. I know that some people take loans to build houses to impress other people and end up in financial troubles. For example, some people build houses with more than 5 bedrooms and yet they have no children or only one or two. My advice is that people should build what they need and what they can afford to avoid getting themselves into financial troubles.

Not too much into status but only the functional aspects of a house.

Ever since I came here I have been renting and do not have any prospects of owning a house if consider my financial situation. However, if I had money, I will like to live in a very spacious modern house. I do like a house with lots of space for my family because at the moment we are crowded in a small rented house.

Type 3 will be nice for me and my family. I also do like Type 4 but it something that I know very well that I cannot afford. If you are struggling to own a house then something like a Type 3 will be a great achievement.

I have lived in a traditional house before and they are dirty and not safe at all. They also require a lot of cleaning and maintenance. When I get a good job I will build a big house with lots of spaces.

If I had money I will build a nice big house in Gaborone for rental purposes. For me a house is an investment and you can get a good return when you build a nice house in Gaborone. I will use that money to build a small house in Mochudi for my family.

Excited about the idea of building her own house and generate income from it. A house to her will be a form of employment.

Type 4 will be great if I can afford it. At the moment Type 2 is what I can afford for my family but not really the house that I like.

I think for me I am lucky because I inherited land from my parents and built a house for my family. I would like a bigger house with more space but I do not have the funds for that. Working for myself also disqualifies me from many government schemes and financial institutions as I do not have regular income

At the moment I own a Type 2 and hopefully after some years I will upgrade to Type 3. I also hope that my children will build a Type 4 for me if they get a good job.

Artificial scarcity that have resulted in high rentals and purchase prices that are not affordable to the majority of the people.

There is lack of accommodation for low and middle income groups, especially the young generation who just start work (25-40yrs) in urban areas due to unaffordable rental properties and the existing market is providing houses that are orientated towards bigger families (5-bed, 5-bath) and single-sharing. No accommodation for middle income families.

There is need for more enablers - subsidized land, low interest loans

Lack of land in urban areas coupled with lack of financial resources (housing is not priority no 1, and incomes are too low for affording loans)

Policies and structures are not coping with dealing with housing needs. The majority of people still rely on sub-standard housing and dwelling units and predominantly resort to ‘rooming’ - staying in one room houses

The limited access and failure to acquire and occupy decent housing. The housing conditions and environment are not improving, rather deteriorating. Most dwellings lack access to building services and amenities

Lack of suitable low income housing

At the moment, the stress is on formal housing which does not adequately address the needs of low income groups and those in the rural areas.

There is a housing problem- mainly in the rural areas where inhabitable structures are quite dominant. Indicative of the widespread poverty.

Appendix E

Scenario I: Understanding the meanings, values and aspirations on housing (Focus group I & II)

This appendix presents recorded activities, comments and observations from Scenario I from the facilitated focused group workshops in Mochudi. This scenario was seeking participants' views and opinions on the meanings, values and understanding of housing situation in Botswana in general.

E.1 Views expressed by participants

E.1.1 From focus group I

Whether the house is traditional or modern, for me it does not matter. The most important thing is for me to be happy and be able to provide for my family.

For me I want a house that I do not have to go outside for anything. I want all rooms to be accessible from inside so that I am not seen by people when I am home with my family. I also want to be protected against criminals.

I do like houses that are seen in Phakalane, I would like to live in one of those houses as I grew up poor living in houses of poor quality.

The government should be doing a lot more for poor people like myself. We cannot afford to buy land, let alone think about building a house. The most difficult thing is

finding a piece of land to build a house. If land was made available, then we can try to build houses for ourselves cheaply as we have more time to do so.

I believe the government is doing enough for the people but we want everything done for us. For example, the government is giving interest free loans but we want the government to build big houses for our family. We should take that as a start and add to that in future. I agree that the money is small but enough to build a decent house if used properly. That is why you need a good builder to advise you.

I would like a very expensive and big house but I will never be able to afford one. I am still renting and land is very expensive in Mochudi. The government should provide land for the youth as it is difficult for them to find land. The waiting list for land application are too long and not worth trying.

I do agree that for me a house should make me happy. The other important factor is that I should be able to afford.

In the past we used to build houses for ourselves but nowadays the council will not let us. We are required to hire architects and builders to build our houses and they are very expensive. The government should allow us to build houses however we want without restricting us.

I agree with my colleague here that we used to build houses for ourselves without the council 'harassing' us. We could use whatever materials that we found and did not have to spend much money. Our families and friends also could help us but nowadays you need builders who are very expensive. We have to use modern materials as the regulations do not allow us to use mud and thatch. All these modern materials are expensive even though they last much longer than mud and thatch.

I would like to live in a house that will be beautiful, designed by an 'architect' as they make nice houses. It should have lots of glass as I think that it beautiful.

Well, speaking as builder, I do like modern house because I think traditional houses are not suited for our times. At the same time, I want a house that I can afford, there is no reason for me to live in a big house and be a big debt, which makes people unhappy. I always tell my clients that they can always extent their houses in future but they think it does not look good. There are many extension around which are not done properly and it compromises the quality of the house.

Nowadays we are given small plots and I want to live in a double storey so that I can have more space for social events like parties for my family and weddings for my children.

A house should be affordable. The problem is that people want to build big houses even though they do not have the finance to do that. People should build what they can afford and save money for future extension. I always advise people not to start with a big house when they do not have money, but most of the time they do not listen to my advice. Many of my clients end up with unfinished houses because they run out of money while the house is being built.

E.1.2 From focus group II

There are many people who owns land but they sell it to buy expensive cars and other luxurious items that have no value. After some years they complain to the government that there is no land.

The authorities or all these 'professionals' always make decision without consulting us because they think we are illiterate and cannot think for ourselves. Most of these professionals go to schools overseas and then copy policies from overseas that are not appropriate for us. I believe that we must be consulted on issues affecting our well-being. It is not just consultation but also implement our ideas because we know what works best for us than the government.

As Batswana we like to have the whole yard to ourselves for social activities such as weddings and funerals. But it is almost impossible nowadays to own a house with a big yard because there is not enough land available. Most of us are resigned to renting for the rest our lives. I may have the money to build a house but then I still more money to buy land which is unaffordable. Therefore, I end up spending money renting rather investing on building my own house. My salary is also not that much to qualify me for a loan and that makes it hard to even think of building my own house. Where will I get P100, 000 just to buy land? I will then need about the same amount just build a basic house which is not even enough for my family. We are used to having land freely available to us and nowadays we have to pay a lot of money for land. There is no way that most people will be able to afford a piece of land in the cities, let alone build a house of their own. The government will have to make land available before we can even think of owning houses.

I think owning my own house is a dream that I do not see happening anytime soon unless I will some lottery. If you think of how much the land cost and how much it cost it build a house, and compare that with my salary, then you know it is impossible for me to own a house. However, I will like to own a house for my family but that is only possible at my home village because land is freely available. Our government has a lot of money but they spend the money on useless things like security and private jets. All

Batswana could be living in a decent homes if our economy was managed properly and the government prioritized on housing. The other option is to make jobs available that pays good salaries.

I only have a house at my home village because land here is not affordable. However, I will like a house for my small family. We are currently renting because we do not have money for land, or even to build a house. There are many people who have sold their land because they do not have money to build a house. The government scheme helps but the amount of money that is given is not enough. We are also not paid that much to even think of saving money for housing.

I do rent only because I am not from here and therefore, I cannot build a permanent home. My house is at my home village as I cannot build a house in Mochudi as I will be retiring soon and going back home. All the money I saved over the years from working, I invested in building a house at my home village where my family is located.

I like modern house with everything inside. I do not want to go outside the house especially at night or when it is hot during the day. I wonder how people in the past survived living in rooms that were separate from each other. It must have been hard for them during bad weather conditions. Also, traditional houses requires a lot of maintenance and don't appear to be secure.

I wish I was also from Botswana to be able to take advantage of the government schemes. There are so many good policies that I think people are lazy to apply for. Many countries do not offer free financial assistance for people as the government of Botswana. I also don't understand why many people in Botswana do not have land even though the country is big and the population is quite small. Maybe the government needs to revise the land policies to prevent a situation were only the same people own more land to themselves.

Ever since I came here I have been renting and do not have any prospects of owning a house if consider my financial situation. However, if I had money, I will like to live in a very spacious modern house. I do like a house with lots of space for my family because at the moment we are crowded in a small rented house.

I have lived in a traditional house before and they are dirty and not safe at all. They also require a lot of cleaning and maintenance. When I get a good job I will build a big house with lots of spaces.

If I had money I will build a nice big house in Gaborone for rental purposes. For me a house is an investment and you can get a good return when you build a nice house in Gaborone. I will use that money to build a small house in Mochudi for my family.

I think for me I am lucky because I inherited land from my parents and built a house for my family. I would like a bigger house with more space but I do not have the funds for that. Working for myself also disqualifies me from many government schemes and financial institutions as I do not have regular income.

E.2 Observation by researchers

E.2.1 From focus group I

To him a house is a place to live happily with his family. It is not about the house itself but how happy he is with his family.

She thinks that policies should favour the poor who cannot afford land. According to her, there is a lot of land in Botswana which is mismanaged or allocated to 'friends'.

The participant believes that the SHHA schemes are enough to build a decent house as a start.

The youngest person in the room and sounding hopeless about the prospects of ever owning a home.

Not happy with the regulations as they make houses expensive.

A young man who seems very ambitious. He likes a houses that are similar to the ones in the city.

Emphasis on starting with an affordable house that can be extended in future.

A majority of people agree with the builder that there are many people who just want a 'big house' even though they cannot afford it or even need it.

E.2.2 From focus group II

Surprised and also critical of people who are not taking advantage of the government initiatives that can benefit them a lot. He thinks that many people do not plan ahead, just interested in selling the land to buy cars to drive. They do not think about the future of their families and where they will live.

A sign of contempt towards 'professionals'.

Argumentative and defensive on the issue that the government is doing enough for the people. He feels the government is capable of doing more but is just being incompetent.

According to him, if the government was not corrupt and driven by a political agenda, everyone would have access to land. He argues that our population is small and we have lots of land for everyone.

Not happy that the government is not using the resources very well.

Critical that the government is not helping with land and finance. Disagreeing with those that think the government is doing enough.

To her a house should be built at someone's village. She does not see any reason why she should build a house at a place that is not her permanent residence. The idea of investing in property does not make sense that much to her. A house should be where your family is located.

Only a modern house will do for her. She does not want anything to do with traditional houses, they are meant for the poor.

Another one who believes many people in Botswana are just too lazy to apply for government schemes even though they need them the most.

A dejected look showing no hope of owning a house.

Facial expression showing that she is not at all into traditional building.

Excited about the idea of building her own house and generate income from it. A house to her will be a form of employment.

Agrees with others that land is a major issue that has to be addressed by the government if people are to own their own homes.

Appendix F

Scenario II & III: Use of design tools by Focus group I & II

This appendix presents recorded comments and observations from Scenario II and III from the facilitated focused group workshops in Mochudi. Scenario II, which was done by focus group I in the first day, participants were given drawings materials (papers and markers), to draw what they consider to be an ideal house to them. Scenario II, which was done by focus group II two days later, participants were given wooden blocks to develop forms and spaces according to their perceptions. The comments from participants and observation by the researchers as recorded during the workshop are presented in the following sections.

F.1 Comments by the participants

Participants were asked to give their views about using the tools provided. Comments from each group are given in the following sections.

F.1.1 Comments from focus group I

I have never drawn in many years and will not make a good drawings. But I will try and show you what kind of a house I would like to live in.

I want to show you the kind of house I was talking about earlier.

Unfortunately I will not be able to draw the house that I want to live in. I have the image in my mind and I can show you some pictures instead.

This is going to be hard, I have no drawings skills. The builders do this for us and just tell them what we want.

I am going to get a set of rulers and make a house that I would like to build for myself in future.

I have never drawn a house in my life and have no idea what I have to do.

Please don't laugh at our drawings because they are not good. We usually don't draw, it is the builders job.

I also never use drawings as a builder, we just use our experience and we build houses that our clients want.

Even though I am builder I do not use buildings. We use our experience to do what our clients want. Sometimes we get drawings from architects but they are useless when we build.

F.1.2 Comments from focus group II

The blocks can be helpful but they are too small for me to make sense of what I am doing. I prefer to tell my builder what kind of a house I want and we go to the site to draw it. I can also show him examples from pictures and then we do the design on site.

It can help to start with this block but I do not believe that a house can be designed based on this process. I prefer to be on site because a house has many challenges that this small blocks cannot resolve.

I can also play with this but I will need to be on site to make the right decisions. They are much better than drawings but it is hard to see how the house will look like because they are the same and they do not show space very well.

We used to build houses using some blocks as kids and this reminds me of that time. It will be nice to turn some of this ideas into real houses but only a good designer can do that I think. I prefer to show builders what kind of a house I like and then we make a 'plan' on site.

I do not know how these would help with the design because they are too small and they do not show spaces at all.

I think these are for kids to play with. I trust my builder to do what I want.

They are nice to play with, I wonder if it is possible to make a building out of them.

The designs that I came up with using these blocks I do not think will be easy to build even though they look interesting. Is it possible that a designer can make a building out of this?

The blocks are good but they are limiting. You cannot see the details that are important for a house such as materials and space.

They are not easy to use and understand.

I never played with blocks before to make a house but it is an interesting way of designing. If they were a bigger it will be much more fun to create spaces using them. At the moment they are too small to understand them very well.

I like the idea of using blocks but they do not show much to help with the design of a house. Maybe bigger pieces will help in terms of spaces as these are too small.

F.2 Observation by researchers

There were two research assistants who were making observations and taking notes during the workshops. The observations are presented in the following sections.

F.2.1 Observations on focus group I

I had to assure him that it is fine to draw whatever they want. It took a lot of convincing to get many people to draw.

There was a general hesitation in the room to draw, but once they got started, they all produced plans similar to houses around Mochudi.

A well drawn house plan with straight lines.

Made at attempt which was good.

Worried that her skills are not good enough.

The drawings are very schematic but the builder insist that they are sufficient for what they do.

Did make some drawings which were clearly not technical.

F.2.2 Observations on focus group II

Not comfortable with the idea of using blocks to develop a design as they are small.

Another complaint about the scale of the block. Prefers to be on site to design. Clearly missing the point of using the blocks for design conceptualization.

Complaining of lack of details to make sense of the design blocks.

Sees blocks as pieces for playing with but not producing serious designs.

Struggling to work the blocks because the scale is too small to do any spatial explorations.

Not keen on trying the blocks.

Doubt if anything can come out of 'playing' with blocks.

Not entirely convinced that a design can come out of 'playing' with blocks.

Blocks limiting in terms of design freedom and also do not offer much details.

Not so much interested in trying using the blocks.

Scale of the blocks is clearly a problem limiting people from exploring design using them.

Struggling with using the blocks for design explorations.

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